

T A B L E S

Requisite to be used with the

ASTRONOMICAL AND NAUTICAL

E P H E M E R I S.

Published by ORDER of the

COMMISSIONERS OF LONGITUDE.

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[2]
A TABLE of the Refraction of the Heavenly Bodies
in Altitude.

App. Alt.	Refrac.	App. Alt.	Refrac.	App. Alt.	Refr.	App. Alt.	Refr.	App. Alt.	Refr.
0	/	0	/	0	/	0	/	0	/
0. 0	33. 0	4. 50	10. 11	10. 30	5. 0	26. 0	1. 56	59. 0	0. 34
5	32. 10	5. 0	9. 54	10. 45	4. 53	27.	1. 51	60.	33
10	31. 22	5. 10	9. 38	11. 0	4. 47	28.	1. 47	61.	32
15	30. 35	5. 20	9. 23	11. 15	4. 40	29.	1. 42	62.	30
20	29. 50	5. 30	9. 8	11. 30	4. 34	30.	1. 38	63.	29
30	28. 22	5. 40	8. 54	11. 45	4. 29	31.	1. 35	64.	28
32	28. 5	5. 50	8. 41	12. 0	4. 23	32.	1. 31	65.	26
36	27. 30	6. 0	8. 28	12. 20	4. 16	33.	1. 28	66.	25
40	27. 0	6. 10	8. 15	12. 40	4. 9	34.	1. 24	67.	24
50	25. 42	6. 20	8. 3	13. 0	4. 3	35.	1. 21	68.	23
1. 0	24. 29	6. 30	7. 51	13. 20	3. 57	36.	1. 18	69.	22
1. 10	23. 20	6. 40	7. 40	13. 40	3. 51	37.	1. 16	70.	21
1. 20	22. 15	6. 50	7. 30	14. 0	3. 45	38.	1. 13	71.	19
1. 30	21. 15	7. 0	7. 20	14. 20	3. 40	39.	1. 10	72.	18
1. 40	20. 18	7. 10	7. 11	14. 40	3. 35	40.	1. 8	73.	17
1. 50	19. 25	7. 20	7. 2	15. 0	3. 30	41.	1. 5	74.	16
2. 0	18. 35	7. 30	6. 53	15. 30	3. 24	42.	1. 3	75.	15
2. 10	17. 48	7. 40	6. 45	16. 0	3. 17	43.	1. 1	76.	14
2. 20	17. 4	7. 50	6. 37	16. 30	3. 10	44.	59	77.	13
2. 30	16. 24	8. 0	6. 29	17. 0	3. 4	45.	57	78.	12
2. 40	15. 45	8. 10	6. 22	17. 30	2. 59	46.	55	79.	11
2. 50	15. 9	8. 20	6. 15	18. 0	2. 54	47.	53	80.	10
3. 0	14. 36	8. 30	6. 8	18. 30	2. 49	48.	51	81.	9
3. 10	14. 4	8. 40	6. 1	19. 0	2. 44	49.	49	82.	8
3. 20	13. 34	8. 50	5. 55	19. 30	2. 39	50.	48	83.	7
3. 30	13. 6	9. 0	5. 48	20. 0	2. 35	51.	46	84.	6
3. 40	12. 40	9. 10	5. 42	20. 30	2. 31	52.	44	85.	5
3. 50	12. 15	9. 20	5. 36	21. 0	2. 27	53.	43	86.	4
4. 0	11. 51	9. 30	5. 31	21. 30	2. 24	54.	41	87.	3
4. 10	11. 29	9. 40	5. 25	22. 0	2. 20	55.	40	88.	2
4. 20	11. 8	9. 50	5. 20	23. 0	2. 14	56.	38	89.	1
4. 30	10. 48	10. 0	5. 15	24. 0	2. 7	57.	37	90.	0
4. 40	10. 29	10. 15	5. 7	25. 0	2. 2	58.	35		

A TABLE of the Moon's Parallax in Altitude.

App. Alt. of D	Horizontal Parallax of the Moon.									
°	53'	54'	55'	56'	57'	58'	59'	60'	61'	62'
1	53'	54'	55'	56'	57'	58'	59'	60'	61'	62'
2	53	54	55	56	57	58	59	60	61	62
3	53	54	55	56	57	58	59	60	61	62
4	53	54	55	56	57	58	59	60	61	62
5	53	54	55	56	57	58	59	60	61	62
6	53	54	55	56	57	58	59	60	61	62
7	53	54	55	56	57	58	59	60	61	62
8	52	53	54	55	56	57	58	59	60	61
9	52	53	54	55	56	57	58	59	60	61
10	52	53	54	55	56	57	58	59	60	61
11	52	53	54	55	56	57	58	59	60	61
12	52	53	54	55	56	57	58	59	60	61
13	52	53	54	55	55	56	57	58	59	60
14	51	52	53	54	55	56	57	58	59	60
15	51	52	53	54	55	56	57	58	59	60
16	51	52	53	54	55	56	57	58	58	59
17	51	52	53	54	54	55	56	57	58	59
18	50	51	52	53	54	55	56	57	58	59
19	50	51	52	53	54	55	56	57	58	59
20	50	51	52	53	54	54	55	56	57	58
21	49	50	51	52	53	54	55	56	57	58
22	49	50	51	52	53	54	55	56	56	57
23	49	50	51	51	52	53	54	55	56	57
24	48	49	50	51	52	53	54	55	56	57
25	48	49	50	51	52	53	53	54	55	56
26	47	48	49	50	51	52	53	54	55	56
27	47	48	49	50	51	52	53	53	54	55
28	47	48	49	49	50	51	52	53	54	55
29	46	47	48	49	50	51	52	52	53	54
30	46	47	48	48	49	50	51	52	53	54

Continuation of the TABLE of the Moon's Parallax in
Altitude.

App. Alt. of ☾	Horizontal Parallax of the Moon.									
°	53'	54'	55'	56'	57'	58'	59'	60'	61'	62'
31	45'	45'	47'	48'	49'	50'	51'	51'	52'	53'
32	45	46	47	47	48	49	50	51	52	53
33	44	45	46	47	48	49	49	50	51	52
34	44	45	46	46	47	48	49	50	51	52
35	43	44	45	46	47	47	48	49	50	51
36	43	44	44	45	45	47	48	48	49	50
37	42	43	44	45	45	46	47	48	49	50
38	42	43	43	44	45	46	46	47	48	49
39	41	42	43	43	44	45	46	47	47	48
40	40	41	42	43	44	44	45	46	47	48
41	40	41	41	42	43	44	44	45	46	47
42	39	40	41	42	42	43	44	45	45	46
43	38	39	40	41	42	42	43	44	45	46
44	38	39	40	40	41	42	42	43	44	45
45	37	38	39	40	40	41	42	43	43	44
46	36	37	38	39	40	40	41	42	42	43
47	36	37	38	38	39	40	40	41	42	43
48	35	36	37	37	38	39	39	40	41	42
49	34	35	36	37	37	38	39	39	40	41
50	34	35	35	36	37	37	38	39	39	40
51	33	34	35	35	36	36	37	38	38	39
52	32	33	34	34	35	36	36	37	38	39
53	31	32	33	34	34	35	35	36	37	38
54	31	32	32	33	33	34	35	35	36	37
55	30	31	31	32	33	33	34	34	35	36
56	29	30	31	31	32	32	33	34	34	35
57	28	29	30	30	31	32	32	33	33	34
58	28	29	29	30	30	31	31	32	32	33
59	27	28	28	29	29	30	30	31	31	32
60	26	27	27	28	28	29	29	30	30	30

[illegible]

▲ TABLE to turn Degrees and Minutes into Time, and the contrary.

D.	H.M.	D.	H.M.	D.	H.M.	D.	H.M.
M.	M. S.	M.	M. S.	M.	M. S.	M.	M. S.
1	0. 4	31	2. 4	61	4. 4	91	6. 14
2	0. 8	32	2. 8	62	4. 8	92	6. 18
3	0. 12	33	2. 12	63	4. 12	93	6. 22
4	0. 16	34	2. 16	64	4. 16	94	6. 26
5	0. 20	35	2. 20	65	4. 20	95	6. 30
6	0. 24	36	2. 24	66	4. 24	96	6. 34
7	0. 28	37	2. 28	67	4. 28	97	6. 38
8	0. 32	38	2. 32	68	4. 32	98	6. 42
9	0. 36	39	2. 36	69	4. 36	99	6. 46
10	0. 40	40	2. 40	70	4. 40	100	6. 50
11	0. 44	41	2. 44	71	4. 44	101	6. 54
12	0. 48	42	2. 48	72	4. 48	102	6. 58
13	0. 52	43	2. 52	73	4. 52	103	7. 02
14	0. 56	44	2. 56	74	4. 56	104	7. 06
15	1. 0	45	3. 0	75	5. 0	105	7. 10
16	1. 4	46	3. 4	76	5. 4	106	7. 14
17	1. 8	47	3. 8	77	5. 8	107	7. 18
18	1. 12	48	3. 12	78	5. 12	108	7. 22
19	1. 16	49	3. 16	79	5. 16	109	7. 26
20	1. 20	50	3. 20	80	5. 20	110	7. 30
21	1. 24	51	3. 24	81	5. 24	111	7. 34
22	1. 28	52	3. 28	82	5. 28	112	7. 38
23	1. 32	53	3. 32	83	5. 32	113	7. 42
24	1. 36	54	3. 36	84	5. 36	114	7. 46
25	1. 40	55	3. 40	85	5. 40	115	7. 50
26	1. 44	56	3. 44	86	5. 44	116	7. 54
27	1. 48	57	3. 48	87	5. 48	117	7. 58
28	1. 52	58	3. 52	88	5. 52	118	8. 02
29	1. 56	59	3. 56	89	5. 56	119	8. 06
30	2. 0	60	4. 0	90	6. 0	120	8. 10

Continuation of the TABLE for turning Degrees and Minutes into Time, and the contrary.

D.	H. M.	D.	H. M.	D.	H. M.	D.	H. M.
121	8. 4	151	10. 4	181	12. 4	211	14. 4
122	8. 8	152	10. 8	182	12. 8	212	14. 8
123	8. 12	153	10. 12	183	12. 12	213	14. 12
124	8. 16	154	10. 16	184	12. 16	214	14. 16
125	8. 20	155	10. 20	185	12. 20	215	14. 20
126	8. 24	156	10. 24	186	12. 24	216	14. 24
127	8. 28	157	10. 28	187	12. 28	217	14. 28
128	8. 32	158	10. 32	188	12. 32	218	14. 32
129	8. 36	159	10. 36	189	12. 36	219	14. 36
130	8. 40	160	10. 40	190	12. 40	220	14. 40
131	8. 44	161	10. 44	191	12. 44	221	14. 44
132	8. 48	162	10. 48	192	12. 48	222	14. 48
133	8. 52	163	10. 52	193	12. 52	223	14. 52
134	8. 56	164	10. 56	194	12. 56	224	14. 56
135	9. 0	165	11. 0	195	13. 0	225	15. 0
136	9. 4	166	11. 4	196	13. 4	226	15. 4
137	9. 8	167	11. 8	197	13. 8	227	15. 8
138	9. 12	168	11. 12	198	13. 12	228	15. 12
139	9. 16	169	11. 16	199	13. 16	229	15. 16
140	9. 20	170	11. 20	200	13. 20	230	15. 20
141	9. 24	171	11. 24	201	13. 24	231	15. 24
142	9. 28	172	11. 28	202	13. 28	232	15. 28
143	9. 32	173	11. 32	203	13. 32	233	15. 32
144	9. 36	174	11. 36	204	13. 36	234	15. 36
145	9. 40	175	11. 40	205	13. 40	235	15. 40
146	9. 44	176	11. 44	206	13. 44	236	15. 44
147	9. 48	177	11. 48	207	13. 48	237	15. 48
148	9. 52	178	11. 52	208	13. 52	238	15. 52
149	9. 56	179	11. 56	209	13. 56	239	15. 56
150	10. 0	180	12. 0	210	14. 0	240	16. 0

Continuation of the TABLE for turning Degrees and Minutes into Time, and the contrary.

D.	H. M.	D.	H. M.	D.	H. M.	D.	H. M.
241	16. 4	271	18. 4	301	20. 4	331	22. 4
242	16. 8	272	18. 8	302	20. 8	332	22. 8
243	16. 12	273	18. 12	303	20. 12	333	22. 12
244	16. 16	274	18. 16	304	20. 16	334	22. 16
245	16. 20	275	18. 20	305	20. 20	335	22. 20
246	16. 24	276	18. 24	306	20. 24	336	22. 24
247	16. 28	277	18. 28	307	20. 28	337	22. 28
248	16. 32	278	18. 32	308	20. 32	338	22. 32
249	16. 36	279	18. 36	309	20. 36	339	22. 36
250	16. 40	280	18. 40	310	20. 40	340	22. 40
251	16. 44	281	18. 44	311	20. 44	341	22. 44
252	16. 48	282	18. 48	312	20. 48	342	22. 48
253	16. 52	283	18. 52	313	20. 52	343	22. 52
254	16. 56	284	18. 56	314	20. 56	344	22. 56
255	17. 0	285	19. 0	315	21. 0	345	23. 0
256	17. 4	286	19. 4	316	21. 4	346	23. 4
257	17. 8	287	19. 8	317	21. 8	347	23. 8
258	17. 12	288	19. 12	318	21. 12	348	23. 12
259	17. 16	289	19. 16	319	21. 16	349	23. 16
260	17. 20	290	19. 20	320	21. 20	350	23. 20
261	17. 24	291	19. 24	321	21. 24	351	23. 24
262	17. 28	292	19. 28	322	21. 28	352	23. 28
263	17. 32	293	19. 32	323	21. 32	353	23. 32
264	17. 36	294	19. 36	324	21. 36	354	23. 36
265	17. 40	295	19. 40	325	21. 40	355	23. 40
266	17. 44	296	19. 44	326	21. 44	356	23. 44
267	17. 48	297	19. 48	327	21. 48	357	23. 48
268	17. 52	298	19. 52	328	21. 52	358	23. 52
269	17. 56	299	19. 56	329	21. 56	359	23. 56
270	18. 0	300	20. 0	330	22. 0	360	24. 0

N. B.
of
Ep

A CORRECT TABLE

OF THE

Longitude and Latitude of the principal Zodiacal Stars proper to take the Moon's Distance from, for finding the Longitude at Sea.

Deduced from Dr. Bradley's Observations.

Beginning of 1767.	Mag- nitud.	Longitude.				Latitude.			
		S.	°	'	"	°	'	"	
γ Pegasi ———	2	0.	5.	54.	38	12.	35.	35	N
* α Arietis ———	2	1.	4.	24.	20	9.	57.	30	N
α Ceti ———	2	1.	11.	3.	56	12.	36.	16	S
* Aldebaran ———	1	2.	6.	32.	3	5.	29.	2	S
β Tauri ———	2	2.	19.	19.	19	5.	21.	59	N
α Orionis ———	1	2.	25.	30.	5	16.	3.	31	S
* Pollux ———	1.2	3.	20.	0.	16	6.	40.	5	N
Procyon ———	1	3.	22.	34.	29	15.	58.	8	S
* Regulus ———	1	4.	26.	35.	31	0.	27.	27	N
β Leonis ———	2	5.	18.	23.	9	12.	17.	8	N
* Spica Virginis ———	1	6.	20.	35.	31	2.	2.	11	S
α Libræ ———	2	7.	11.	50.	11	0.	21.	48	N
β Libræ ———	2	7.	16.	7.	23	8.	31.	32	N
* Antares ———	1	8.	6.	30.	40	4.	32.	17	S
σ Sagittarii ———	2.3	9.	9.	7.	59	3.	24.	55	S
* α Aquilæ ———	1	9.	28.	29.	13	29.	18.	36	N
* β Capricorni ———	3	10.	0.	47.	37	4.	36.	46	N
* Fomalhaut ———	1	11.	0.	34.	47	21.	6.	28	S
* α Pegasi ———	2	11.	20.	14.	30	19.	24.	38	N

N. B. Those Stars only marked with Asterisks are made use of in the Distances of the Astronomical and Nautical Ephemeris.

TABLE to find the Aberration of a Zodiacal Star in Longitude.

Aberration * in Longitude.				
Arg. Long. ☉		Long. *		
Sign.	0	1	2	
Sig.	6	7	8	
0	//	//	//	0
0	20	17	10	30
3	20	17	9	27
6	20	16	8	24
9	20	16	7	21
12	20	15	6	18
15	19	14	5	15
18	19	13	4	12
21	19	13	3	9
24	18	12	2	6
27	18	11	1	3
30	17	10	0	0
Sig.	11	10	9	
Sig.	5	4	3	

A particular Table of Limits for α Aquilæ.

Lat. N.	Dif. of Lon. & α Aquil.	Lat. S.	Dif. of Lon. & α Aquil.
0	0	0	0
0	48. 26	0	48. 26
1	47. 15	1	49. 45
2	46. 43	2	51. 3
3	44. 11	3	52. 10
4	42. 43	4	53. 21
5	41. 10	5	54. 26
5°. 20'	40. 38	5°. 20'	54. 46

A TABLE for choosing proper Stars for observing the Moon's Dist. from.

Dif. or Sum of D & * Lats.	Dif. of Lon. of D & *.
0	0
1	10. 0
2	10. 0
3	10. 0
4	10. 0
5	10. 0
6	10. 57
7	12. 49
8	14. 42
9	16. 37
10	18. 34
11	20. 33
12	22. 35
13	24. 39
14	26. 46
15	28. 57
16	31. 12
17	33. 31
18	35. 56
19	38. 28
20	41. 6
21	43. 54
22	46. 52
23	50. 3
24	53. 32
25	57. 23
26	61. 49
27	66. 58
28	73. 48

A TABLE for finding the Correction of the Moon's Longitude or Latitude, obtained by Proportion from the Places calculated for Noon and Midnight.

App. Time after Noon or Mid- night.	Second Difference of Moon's Place.										App. Time after Noon or Mid- night.
	1'	2'	3'	4'	5'	6'	7'	8'	9'	10'	
H. M.	//	//	//	//	//	//	//	//	//	//	H. M.
0. 0	0	0	0	0	0	0	0	0	0	0	12. 0
0. 10	0	1	1	2	2	2	3	3	4	4	11. 50
0. 20	1	2	2	3	4	5	6	6	7	8	11. 40
0. 30	1	2	4	5	6	7	8	10	11	12	11. 30
0. 40	2	3	5	6	8	9	11	13	14	16	11. 20
0. 50	2	4	6	8	10	12	13	15	17	19	11. 10
1. 0	2	5	7	9	11	14	16	18	21	23	11. 0
1. 10	3	5	8	10	13	16	18	21	24	26	10. 50
1. 20	3	6	9	12	15	18	21	24	27	30	10. 40
1. 30	3	6	10	13	16	20	23	26	29	33	10. 30
1. 40	4	7	11	14	18	21	25	29	32	36	10. 20
1. 50	4	8	12	15	19	23	27	31	35	39	10. 10
2. 0	4	8	12	17	21	25	29	33	37	42	10. 0
2. 10	4	9	13	18	22	27	31	35	40	44	9. 50
2. 20	5	9	14	19	23	28	33	38	42	47	9. 40
2. 30	5	10	15	20	25	30	34	39	44	49	9. 30
2. 40	5	10	15	21	26	31	36	41	47	52	9. 20
2. 50	5	11	16	22	27	32	38	43	49	54	9. 10
3. 0	6	11	17	23	28	34	39	45	51	56	9. 0
3. 10	6	12	17	23	29	35	41	46	52	58	8. 50
3. 20	6	12	18	24	30	36	42	48	54	60	8. 40
3. 30	6	12	18	25	31	37	43	49	56	62	8. 30
3. 40	6	13	19	25	32	38	45	51	57	64	8. 20
3. 50	6	13	19	26	33	39	46	52	59	65	8. 10
4. 0	7	13	20	27	33	40	47	53	60	67	8. 0
4. 10	7	14	20	27	34	41	47	54	61	68	7. 50
4. 20	7	14	21	28	35	41	48	55	62	69	7. 40
4. 30	7	14	21	28	35	42	49	56	63	70	7. 30
4. 40	7	14	21	28	36	43	50	57	64	71	7. 20
4. 50	7	14	22	29	36	43	50	58	65	72	7. 10
5. 0	7	15	22	29	36	44	51	58	66	73	7. 0
5. 30	7	15	22	30	37	45	52	60	67	74	6. 30
6. 0	7	15	22	30	37	45	52	60	67	75	6. 0

Add the Correction to the Moon's Longitude or Latitude, when the Motion in 12 Hours is decreasing; and subtract it from the same, when the Motion in 12 Hours is increasing.

A CATALOGUE of the Right Ascensions and Declinations of the principal fixed Stars of the first and second Magnitude, adapted to the Year 1767, with their Variations in Ten Years.

Names of the Stars.	Character.	Magnitude.	Right Ascension.	Right Ascension increases in 10 Years.	Declination.	Declination increases or diminishes in 10 Years.
Extremity of the Wing of Pegasus, <i>Algenib</i> , —	γ	2	0. 19	7. 42	13. 54 N	+3. 29
In the Head of the Phoenix, —	α	2	3. 41	7. 30	43. 34 S	-3. 20
The bright Star in the Tail of the Whale, —	β	2	7. 59	7. 32	19. 15 S	-3. 18
In the Girdle of Andromeda, —	β	2	14. 11	8. 14	34. 23 N	+3. 14
The Spring of the River Eridanus, <i>Achernar</i> , —	α	1	22. 15	5. 37	58. 25 S	-3. 5
In the Jaw of the Whale, —	α	2	42. 32	7. 49	3. 10 N	+2. 28
In the Head of Medusa, <i>Algol</i> , —	β	2	43. 7	9. 36	40. 3 N	+2. 26
The bright Star of Perseus, —	α	2	46. 58	10. 29	49. 1 N	+2. 17
The South Eye of the Bull, <i>Aldebaran</i> , —	α	1	65. 39	8. 34	16. 1 N	+1. 23
The bright Star in the Left Shoulder of Auriga, <i>Capella</i> , —	α	1	74. 52	11. 0	45. 44 N	+0. 53
The bright Foot of Orion, <i>Rigel</i> , —	β	1	75. 44	7. 12	8. 29 S	-0. 50
The North Horn of the Bull, —	β	2	77. 44	9. 27	28. 23 N	+0. 43
The Western Shoulder of Orion, —	γ	2	78. 10	8. 3	6. 7 N	+0. 42
Bright Star in the Dove, —	α	2	82. 48	5. 30	34. 13 S	-0. 25
The Eastern Shoulder of Orion, —	α	1	85. 39	8. 7	7. 21 N	+0. 16
The bright Star in the Poop of the Ship Argo, <i>Canopus</i> , —	α	1	94. 42	3. 21	52. 34 S	+0. 16
The bright Star in the Dog's Mouth, <i>Sirius</i> , —	α	1	98. 44	6. 43	16. 24 S	+0. 30
In the Head of the Northern Twin, <i>Castor</i> , —	α	1	109. 55	9. 41	32. 23 N	-1. 7
The little Dog, <i>Procyon</i> , —	α	1	111. 47	8. 0	5. 49 N	-1. 13
In the Head of the Southern Twin, <i>Pollux</i> , —	β	1	112. 46	8. 23	28. 35 N	-1. 17
The bright Star in the Square of the great Bear, —	α	2	162. 17	9. 44	63. 0 N	-3. 19
The Lion's Tail, —	β	2	174. 18	7. 47	15. 52 N	-3. 19

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in the Head of the Northern Twin, <i>Cygnus</i> , The little Dog, <i>Procyon</i> , In the Head of the Southern Twin, <i>Pollux</i> .	α β	2 2	162. 17 174. 18	9. 44 7. 47	63. 02 15. 52 N	—3. 10 —3. 19
Northernmost Star in the Square of the great Bear, The Lion's Tail,	α β	2 2	183. 28 198. 15	8. 3 7. 52	61. 49 S 9. 56 S	+3. 20 +3. 10
Southernmost Star of the Crociers, or the Foot of the Cross, The Virgin's Spike,	α α	1 1	204. 35 206. 54	6. 1 10. 13	50. 29 N 59. 14 S	—3. 2 +2. 59
The last Star in the Tail of the great Bear, The Westernmost Foot of the Centaur,	η β	2 2	211. 15	7. 3	20. 24 N	—2. 52
The bright Star in Bootes, <i>Arcturus</i> ,	α	1	216. 1 219. 31	11. 1 8. 16	59. 52 S 15. 4 S	+2. 42 +2. 35
The bright Star in the Eastern Foot of the Centaur, The Southern Scale of Libra,	α α	1 2	226. 8 231. 14	8. 3 6. 20	8. 31 S 27. 30 N	+2. 20 —2. 6
The Northern Star of Libra, The bright Star of the Crown,	β α	2 2	237. 59	8. 40	19. 8 S	+1. 47
The Northernmost Star of the Scorpion's Forehead,	β	2				
The Scorpion's Heart, <i>Antares</i> , In the Eastern Knee of Ophiuchus,	α α	1 2	243. 47 254. 16	9. 8 8. 36	25. 53 S 15. 25 S	+1. 29 +0. 55
The Head of Ophiuchus, The bright Star of the Harp, <i>Lyra</i> ,	α α	2 1	261. 2 277. 16	6. 57 5. 3	12. 45 N 38. 35 N	—0. 32 +0. 25
The bright Star of the Eagle, <i>Atair</i> ,	α	2	294. 52	7. 15	8. 16 N	+1. 23
The Eye of the Peacock, The Tail of the Swan,	α α	2 2	301. 47 308. 22	12. 13 5. 7	57. 28 S 44. 27 N	—1. 44 +2. 4
The Westernmost Wing of the Crane, In the Mouth of the Southern Fish, <i>Fomalhaut</i> ,	α α	2 1	328. 23 341. 11	9. 56 8. 21	48. 4 S 30. 51 S	—2. 50 —3. 9
In the Shoulder of Pegasus, In the Wing of Pegasus, <i>Markab</i> ,	β α	2 1	343. 8 343. 18	7. 12 7. 27	26. 50 N 13. 58 N	+3. 11 +3. 12
The Head of Andromeda,	α	2	359. 6	7. 40	27. 48 N	+3. 20

A TABLE of the Multipliers of the Difference between the Moon's Longitude computed, and that inferred from Observation, to find the Error of the Ship's Account in Longitude.

Enter with hourly Motion of ☾, or Difference of hourly Motions of ☉ and ☾, according as ☾'s Distance is taken from a Star or the Sun.

Ho. Mo. ☾ or diff. Ho. Mo. ☉ & ☾	Multi- pliers.	Ho. Mo. ☾ or diff. Ho. Mo. ☉ & ☾	Multi- pliers.
I II		I II	
25. 45	35,0	32. 0	28,1
26. 0	34,6	32. 15	27,9
26. 15	34,3	32. 30	27,7
26. 30	34,0	32. 45	27,5
26. 45	33,6		
27. 0	33,3	33. 0	27,3
27. 15	33,0	33. 15	27,1
27. 30	32,7	33. 30	26,9
27. 45	32,4	33. 45	26,7
28. 0	32,1	34. 0	26,5
28. 15	31,8	34. 15	26,3
28. 30	31,6	34. 30	26,1
28. 45	31,3	34. 45	25,9
29. 0	31,0	35. 0	25,7
29. 15	30,8	35. 15	25,5
29. 30	30,5	35. 30	25,3
29. 45	30,2	35. 45	25,2
30. 0	30,0	36. 0	25,0
30. 15	29,7	36. 15	24,8
30. 30	29,5	36. 30	24,7
30. 45	29,3	36. 45	24,5
31. 0	29,0	37. 0	24,3
31. 15	28,8	37. 15	24,2
31. 30	28,6	37. 30	24,0
31. 45	28,3	37. 45	23,8
		38. 0	23,7

A TABLE of the Depression or Dip of the Horizon of the Sea.

Elevation of the Eye above the Sea in Feet.	Depression of the Horizon of the Sea.
1	0. 57
2	1. 21
3	1. 39
4	1. 55
5	2. 8
6	2. 20
7	2. 31
8	2. 42
9	2. 52
10	3. 1
12	3. 18
14	3. 34
16	3. 49
18	4. 3
20	4. 16
22	4. 28
24	4. 40
26	4. 52
28	5. 3
30	5. 14
35	5. 39
40	6. 2
45	6. 24
50	6. 44
60	7. 23
70	7. 59
80	8. 32
90	9. 3
100	9. 33

Right Ascensions and Declinations of some of the principal fixed Stars.

Deduced from Dr. Bradley's Observations.

Jan. 1, 1767.	Right Ascen- sions.	Ann. Varia. in AR.	Declination.	Ann. Va- riation in Decli- nation.	Magnitudes.
Stars Names.	° ' "	"	° ' "	"	
γ Pegasi —	9. 18. 58,4	46,20	13. 53. 15,3 N	+20,04	2
α Arietis —	28. 31. 18,4	50,06	22. 21. 02,5 N	+17,64	2
α Ceti —	42. 31. 53,1	46,93	3. 9. 44,1 N	+14,80	2
Aldebaran —	65. 38. 36,6	51,41	16. 1. 18,1 N	+ 8,32	1
Capella —	74. 52. 41,7	66,03	45. 43. 39,0 N	+ 5,28	1
Rigel —	75. 50. 13,8	43,30	8. 29. 15,4 S	— 4,94	1
β Tauri —	77. 53. 44,6	56,80	28. 23. 17,7 N	+ 4,24	2
α Orionis —	85. 38. 28,4	48,75	7. 20. 35,9 N	+ 1,56	1
Sirius —	98. 43. 19,2	40,35	16. 24. 28,1 S	+ 3,10	1
Castor —	109. 55. 32,8	58,15	32. 22. 36,4 N	— 6,80	2
Procyon —	111. 46. 33,3	48,08	5. 48. 32,1 N	— 7,42	1
Pollux —	112. 45. 37,6	56,27	28. 34. 9,1 N	— 7,72	2
Regulus —	148. 59. 12,7	48,60	13. 5. 49,6 N	—17,17	1
Spica Virginis —	198. 14. 15,0	47,27	9. 56. 17,0 S	+18,97	1
Arcturus —	211. 15. 49,2	42,32	20. 24. 31,9 N	—17,16	1
Antares —	248. 47. 25,3	54,92	25. 53. 36,3 S	+ 8,89	1
ε Sagittarii —	272. 10. 43,6	59,95	34. 28. 7,5 S	— 0,72	2
α Aquilæ —	294. 51. 5,5	43,54	8. 16. 3,8 N	+ 8,40	1
2: α Capricorni —	301. 16. 42,4	50,20	13. 15. 0,2 S	—10,40	3
Fomalhaut —	341. 10. 55,5	50,67	30. 51. 1,2 S	—18,97	1
α Pegasi —	343. 17. 35,7	44,75	13. 57. 20,4 N	+19,20	2

Longitudes and Latitudes of some of the principal fixed Stars.

Deduced from Dr. Bradley's Observations.

Jan. 1, 1767.	Longitude.	Latitude.	Magnitudes.
Stars Names.	° ' "	° ' "	
γ Pegasi ———	γ 5. 54. 38,5	12. 35. 34,5 N	2
α Arietis ———	δ 4. 24. 20,0	9. 57. 30,0 N	2
α Ceti ———	δ 11. 3. 56,0	12. 36. 16,0 S	2
Aldebaran ———	Π 6. 32. 02,5	5. 29. 02,0 S	1
Rigel ———	13. 34. 26,0	31. 9. 10,0 S	1
Capella ———	18. 36. 11,0	22. 51. 46,0 N	1
β Tauri ———	19. 19. 19,0	5. 21. 59,0 N	2
α Orionis ———	25. 30. 05,0	16. 3. 31,0 S	1
Sirius ———	$\S$ 10. 52. 26,0	39. 32. 55,0 S	1
Castor ———	16. 59. 51,0	10. 4. 35,0 N	2
Pollux ———	20. 0. 16,0	6. 40. 04,5 N	2
Procyon ———	22. 34. 29,5	15. 58. 08,0 S	1
Regulus ———	Ω 26. 35. 31,0	0. 27. 27,0 N	1
Spica Virginis ———	$\equiv$ 20. 35. 32,0	2. 2. 11,0 S	1
Arcturus ———	20. 59. 04,0	30. 54. 10,5 N	1
Antares ———	$\ddagger$ 6. 30. 40,0	4. 32. 17,0 S	1
ϵ Sagittarii ———	$\wp$ 1. 49. 47,0	11. 0. 45,0 S	2
α Aquilæ ———	28. 29. 13,0	29. 18. 36,0 N	1
2 α Capricorni ———	$\approx$ 0. 36. 19,0	6. 57. 16,0 N	3
Fomalhaut ———	H 0. 34. 47,0	21. 6. 28,0 S	1
α Pegasi ———	20. 14. 30,0	19. 24. 37,5 N	2

NEW
T A B L E S
AND
R U L E S

FOR CORRECTING THE
APPARENT DISTANCE
OF THE
MOON FROM THE SUN

OR A
FIXED STAR,

ON ACCOUNT OF
REFRACTION AND PARALLAX.

BY MR. LYONS.

NEW
TABLES
AND
RULES

FOR CORRECTING THE
APPARENT DISTANCE
OF THE
MOON FROM THE SUN

OR A
FIXED STAR

ON ACCOUNT OF
REFRACTION AND PARALLAX

BY MR. LYONS.

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TABLE I.
For Refraction, by Mr. LYONS.

Alt.	3°	4°	5°	6°	7°	8°	9°	10°	11°	12°	13°	14°	15°	16°	17°	18°	19°	20°	21°	22°	23°	24°	25°
5	0318	0158	0069																				
6	0732	0419	0368	0283																			
7	1142	0712	0468	0329	0341																		
8	1541	1025	0692	0498	0401	0392																	
9	1921	1339	0914	0673	0509	0438	0429																
10	2279	1646	1106	0866	0646	0522	0464	0449															
11	2614	1942	1439	1070	0801	0614	0531	0480	0469														
12	2924	2227	1687	1280	0971	0763	0624	0538	0494	0488													
13	3228	2498	1929	1521	1147	0905	0733	0615	0541	0507	0500												
14	3505	2757	2164	1697	1325	1054	0853	0707	0607	0546	0516	0509											
15	3771	3004	2302	1900	1503	1174	0980	0878	0684	0601	0548	0521	0515										
16	4021	3238	2607	2099	1682	1364	1116	0923	0776	0673	0600	0554	0529	0520									
17	4256	3461	2815	2290	1854	1517	1249	1036	0870	0747	0656	0592	0550	0533	0524								
18	4479	3674	3016	2476	2024	1670	1385	1155	0971	0831	0723	0644	0585	0554	0532	0524							
19	4691	3890	3208	2656	2191	1822	1522	1276	1076	0921	0799	0704	0631	0587	0550	0531	0526						
20	4892	4070	3392	2830	2353	1971	1658	1398	1184	1016	0879	0771	0689	0627	0578	0547	0533	0527					
21	5088	4255	3583	2949	2510	2108	1975	1523	1296	1114	0974	0847	0776	0682	0620	0574	0550	0534	0531				
22	5268	4433	3742	3162	2662	2250	1928	1646	1408	1212	1065	0924	0863	0737	0663	0611	0575	0553	0533	0545			
23	5447	4601	3921	3318	2711	2391	2057	1766	1519	1311	1150	1002	0907	0795	0713	0656	0608	0575	0557	0551	0546		
24	5610	4767	4062	3469	2956	2536	2183	1884	1629	1411	1232	1079	0952	0853	0764	0700	0641	0600	0573	0560	0553	0546	
25	5769	4933	4106	3613	3094	2668	2307	1992	1731	1511	1322	1162	1031	0911	0819	0741	0679	0631	0597	0577	0558	0550	0546
26	5924	5072	4357	3755	3230	2797	2428	2114	1838	1611	1411	1245	1099	0983	0878	0788	0700	0663	0626	0598	0576	0558	0548
27	6070	5215	4497	3889	3361	2921	2547	2223	1941	1706	1502	1326	1170	1053	0939	0842	0793	0705	0657	0622	0595	0570	0556
28	6211	5354	4633	4019	3487	3040	2662	2332	2041	1801	1593	1408	1251	1123	1000	0899	0817	0748	0689	0656	0620	0591	0569
29	6346	5486	4762	4146	3607	3158	2773	2440	2145	1896	1680	1492	1325	1193	1064	0958	0869	0799	0735	0697	0652	0616	0588
30	6477	5614	4888	4268	3724	3272	2882	2543	2245	1992	1768	1574	1405	1263	1129	1017	0922	0849	0782	0741	0682	0644	0611
31	6602	5738	5008	4385	3839	3382	2988	2644	2341	2082	1852	1667	1479	1335	1199	1072	0977	0876	0826	0773	0718	0668	0633
32	6723	5857	5124	4499	3950	3489	3092	2744	2435	2170	1937	1738	1553	1405	1258	1136	1031	0941	0863	0806	0752	0693	0663
33	6839	5971	5240	4610	4057	3593	3192	2840	2525	2247	2021	1816	1628	1474	1322	1196	1088	0992	0906	0846	0791	0732	0691
34	6951	6082	5347	4714	4160	3694	3288	2931	2613	2320	2106	1892	1703	1541	1386	1255	1143	1041	0959	0888	0828	0770	0719
35	7059	6189	5350	4818	4260	3790	3383	3014	2704	2430	2185	1968	1775	1610	1452	1316	1198	1099	1007	0935	0870	0809	0755
36	7164	6292	5553	4918	4355	3884	3475	3111	2790	2514	2266	2036	1844	1676	1517	1377	1255	1146	1055	0983	0910	0849	0788
37	7264	6391	5650	5013	4449	3975	3563	3197	2874	2596	2341	2113	1914	1743	1579	1435	1310	1192	1102	1026	0951	0884	0823
38	7361	6487	5745	5105	4541	4065	3649	3282	2956	2676	2413	2188	1981	1807	1640	1492	1364	1248	1149	1069	0990	0920	0856
39	7454	6580	5835	5195	4629	4151	3733	3363	3033	2748	2487	2257	2049	1871	1700	1549	1407	1298	1197	1111	1032	0956	0893
40	7545	6669	5924	5282	4714	4234	3814	3442	3108	2819	2560	2325	2114	1934	1760	1605	1470	1348	1245	1153	1072	0993	0927
41	7632	6755	6009	5367	4798	4315	3843	3518	3163	2891	2634	2392	2180	1996	1808	1661	1508	1398	1290	1199	1115	1032	0963
42	7717	6838	6092	5447	4877	4395	3969	3593	3255	2962	2707	2457	2243	2057	1875	1717	1565	1449	1335	1245	1156	1072	0997
43	7798	6919	6171	5526	4948	4467	4043	3666	3324	3030	2767	2521	2303	2115	1932	1769	1621	1496	1381	1287	1198	1110	1034
44	7877	6997	6248	5603	5028	4542	4114	3736	3392	3096	2826	2584	2360	2172	1986	1821	1676	1541	1427	1329	1238	1149	1069
45	7953	7073	6322	5676	5100	4613	4185	3796	3460	3160	2888	2644	2423	2229	2041	1875	1726	1592	1472	1370	1278	1185	1106
46	8027	7146	6395	5747	5169	4682	4252	3870	3529	3224	2950	2704	2479	2281	2093	1926	1777	1638	1517	1411	1316	1222	1136
47	8097	7215	6466	5815	5237	4748	4318	3933	3590	3284	3008	2761	2535	2336	2144	1974	1827	1690	1560	1460	1355	1258	1173
48	8166	7283	6532	5881	5303	4811	4381	3993	3649	3342	3064	2815	2588	2388	2192	2019	1869	1729	1602	1498	1392	1294	1209
49	8232	7345	6596	5946	5367	4874	4442	4054	3706	3399	3119	2869	2641	2439	2242	2068	1914	1771	1642	1535	1430	1328	1242
50	8296	7414	6659	6008	5428	4935	4500	4113	3762	3454	3174	2921	2688	2487	2290	2116	1956	1810	1682	1571	1467	1361	1274
51	8358	7475	6721	6069	5487	4993	4557	4169	3817	3507	3226	2972	2738	2535	2335	2159	1996	1849	1720	1609	1517	1397	1307
52	8418	7544	6780	6127	5544	5049	4612	4223	3869	3558	3276	3021	2784	2581	2378	2201	2036	1886	1758	1646	1565	1433	1338
53	8475	7594	6836	6183	5600	5104	4667	4275	3921	3609	3326	3069	2831	2626	2423	2246	2080	1928	1797	1682	1586	1466	1369
54	8531	7646	6890	6237	5652	5156	4719	4325	3969	3659	3373	3115	2876	2669	2463	2289	2120	1967	1835	1717	1605	1498	1399
55	8584	7699	6944	6288	5705	5208	4769	4374	4019	3706	3420	3161	2922	2714	2510	2326	2161	2008	1872	1754	1642	1530	1433
56	8636	7751	6994	6339	5754	5257	4817	4423	4067	3753	3466	3206	2965	2755	2550	2365	2198	2044	1909	1790	1676	1562	1464
57	8688	7807	7043	6387	5803	5309	4864	4469	4110	3798	3508	3249	3005	2797	2589	2405	2235	2083	1944	1824	1709	1596	1490
58	8733	7847	7090	6434	5849	5359	4909	4513	4153	3840	3550	3290	3045	2837	2628	2443	2272	2119	1978	1858	1740	1629	1526
59	8788	7892	7136	6479	5894	5399	4953	4557	4196	3882	3591	3331	3085	2876	2667	2481	2308	2153	2011	1891	1774	1662	1555
60	8823	7937	7179	6523	5937	5437	4995	4598	4239	3922	3633	3369	3126	2913	2704	2516	2345	2185	2044	1923	1807	1694	1584
61	8866	7979	7221	6565	5978	5478	5035	4637	4278	3961	3671	3406	3162	2948	2738	2548	2378	2218	2075	1952	1834	1719	1611
62	8907	8020	7261	6605	6017	5517	5073	4675	4315	3998	3707	3442	3196	2982	2771	2581	2409	2250	2106	1981	1864	1743	1640
63	8946	8059	7300	6643	6055	5554	5110	4711	4351	4033	3742	3476	3230	3014	2803	2612	2440	2277	2133	2007	1890	1769	1664
64	8982	8096	7337	6679	6091	5589	5145	4746	4385	4067	3773	3508	3256	3045	2831	2641	2466	2304	2159	2033	1915	1793	1688
65	9019	8132	73																				

TABLE II.
Refraction. By Mr. LYONS.

Distance.	Lesser Altitude.						Distance.
	3°	4°	5°	6°	8°	10° de above	
0	"	"	"	"	"	"	
10	580	603	616	626	633	641	
11	527	547	558	568	575	581	
12	482	501	510	520	526	531	
13	444	461	470	478	484	489	
14	411	427	435	443	448	453	
15	382	397	405	412	417	422	
16	359	370	378	385	390	394	
17	337	348	355	363	367	370	
18	317	327	333	340	344	348	
19	298	309	315	320	324	329	
20	282	292	298	303	307	311	
21	268	277	283	288	291	295	
22	255	263	269	273	277	280	
23	243	251	254	261	263	267	
24	231	239	244	249	251	254	
25	219	228	233	237	239	243	
26	211	218	222	227	230	232	
27	202	209	213	218	220	222	
28	194	200	204	208	210	212	
29	185	192	196	200	202	204	
30	177	184	188	192	194	196	
31	170	176	181	185	187	188	
32	164	170	174	177	179	181	
33	158	165	167	171	173	174	
34	151	158	161	165	166	167	
35	146	151	155	158	159	161	
36	140	146	149	152	154	155	
37	134	141	144	147	149	150	
38	130	135	139	142	143	144	
39	126	131	134	137	138	139	
40	122	126	129	132	133	135	
41	118	122	124	127	129	131	
42	114	116	120	123	124	126	
43	111	112	116	118	120	122	
44	107	109	112	114	116	117	
45	103	106	108	110	112	113	
46	100	103	105	107	108	109	
47	96	99	101	103	105	105	
48	93	95	98	99	101	101	
49	89	91	95	96	97	97	
50	86	88	92	93	94	93	
51	83	86	88	89	90	90	
52	80	83	85	86	87	86	
53	77	80	82	83	84	84	
54	74	77	79	80	81	82	
55	71	74	76	77	78	79	
56	69	71	73	74	75	76	
57	66	69	70	71	73	73	
58	64	66	68	69	70	70	
59	61	64	65	66	67	68	
60	59	61	63	64	64	65	
61	57	59	60	61	61	63	
62	55	56	58	59	59	60	
63	53	54	55	55	56	58	
64	50	52	53	54	54	55	
65	48	50	50	51	52	53	
66	46	49	48	49	50	51	
67	43	46	46	47	48	48	
68	41	44	43	44	46	46	
69	39	41	41	42	43	43	
70	37	39	39	40	41	41	
71	35	37	37	38	39	39	
72	33	34	35	36	37	37	
73	31	32	33	34	35	34	
74	29	30	30	31	32	32	
75	27	28	28	29	30	30	
76	25	26	26	27	28	28	
77	23	24	24	25	26	26	
78	21	22	23	23	24	24	
79	20	21	21	21	22	22	
80	18	19	19	20	20	20	
81	16	17	17	18	18	18	
82	14	15	15	16	16	16	
83	12	13	13	14	14	14	
84	11	11	11	12	12	12	
85	9	9	9	10	10	10	
86	7	7	7	8	8	8	
87	5	5	5	6	6	6	
88	3	4	4	4	4	4	
89	2	2	2	2	2	2	
90	0	0	0	0	0	0	

TABLE III.
For Refraction.
By Mr. LYONS.

Add to App. Dist.			
Distance.	Effect of Re- fraction.	Distance.	Effect of Re- fraction.
0	"	0	"
10	10		
11	11	66	74
12	12	67	75
13	13	68	77
14	14	69	78
15	15	70	80
16	16	71	81
17	17	72	83
18	18	73	85
19	19	74	86
20	20	75	87
21	21	76	89
22	22	77	91
23	23	78	92
24	24	79	94
25	25	80	96
26	26	81	97
27	27	82	99
28	28	83	101
29	29	84	103
30	30	85	104
31	32	86	106
32	33	87	108
33	34	88	110
34	35	89	112
35	36	90	114
36	37	91	116
37	38	92	118
38	39	93	120
39	40	94	122
40	41	95	124
41	43	96	127
42	44	97	129
43	45	98	131
44	46	99	133
45	47	100	136
46	48	101	138
47	49	102	141
48	51	103	143
49	52	104	146
50	53	105	149
51	54	106	151
52	56	107	154
53	57	108	157
54	58	109	160
55	59	110	163
56	61	111	166
57	62	112	169
58	63	113	172
59	64	114	176
60	66	115	179
61	67	116	182
62	68	117	186
63	70	118	190
64	71	119	193
65	73	120	197

Parallax in Altitude or Distance.	Add th																												
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
5	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	3	3	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
10	5	5	4	4	4	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
11	6	5	5	4	4	4	4	3	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
12	7	6	6	5	5	4	4	4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
13	8	8	7	6	6	5	5	5	5	4	4	4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
14	10	9	8	7	7	6	6	6	6	5	5	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
15	11	10	9	8	8	7	7	6	6	6	5	5	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
16	13	11	10	9	9	8	8	7	7	6	6	6	6	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
17	14	13	12	11	10	9	9	8	8	7	7	6	6	6	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
18	16	14	13	12	11	10	10	9	9	8	8	7	7	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
19	18	16	15	14	13	12	11	10	10	9	8	8	7	7	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
20	20	18	16	15	14	13	12	11	11	10	9	9	8	8	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
21	22	20	18	17	15	14	13	12	12	11	10	10	9	9	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
22	24	22	20	18	17	16	15	14	13	12	11	11	10	10	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
23	26	24	22	20	18	17	16	15	14	13	12	11	11	10	10	9	9	9	9	9	9	9	9	9	9	9	9	9	9
24	29	26	24	22	20	19	18	17	16	15	14	13	12	11	11	10	10	9	9	9	9	9	9	9	9	9	9	9	9
25	31	28	26	24	22	21	19	18	17	16	15	14	13	12	11	11	10	10	9	9	9	9	9	9	9	9	9	9	9
26	34	31	28	26	24	22	21	19	18	17	16	15	14	13	12	11	11	10	10	9	9	9	9	9	9	9	9	9	9
27	36	33	30	28	26	24	22	21	19	18	17	16	15	14	13	12	11	11	10	10	9	9	9	9	9	9	9	9	9
28	39	35	32	30	28	26	24	22	21	20	19	18	17	16	15	14	13	12	11	11	10	10	9	9	9	9	9	9	9
29	42	38	34	32	30	28	25	24	22	21	20	19	18	17	16	15	14	13	12	11	11	10	10	9	9	9	9	9	9
30	45	41	37	34	32	29	27	25	24	22	21	20	19	18	17	16	15	14	13	12	11	11	10	10	9	9	9	9	9
31	48	44	39	37	34	31	29	27	25	24	23	22	21	19	18	18	17	16	16	16	16	16	16	16	16	16	16	16	16
32	51	46	42	39	36	33	31	29	27	25	24	23	22	21	20	19	18	17	17	17	17	17	17	17	17	17	17	17	
33	54	49	44	41	38	35	33	31	29	27	25	24	23	22	21	20	19	19	18	18	18	18	18	18	18	18	18	18	
34	57	52	47	44	41	38	35	33	31	29	27	25	24	23	22	21	21	20	19	19	19	19	19	19	19	19	19	19	
35	60	55	50	46	43	40	37	35	33	31	29	27	25	24	23	23	22	21	20	19	19	19	19	19	19	19	19	19	
36	64	58	53	49	45	42	40	37	35	33	31	29	27	26	25	24	23	22	21	20	19	19	19	19	19	19	19	19	
37	67	61	56	52	48	45	42	39	37	35	32	31	29	28	26	25	24	23	22	21	20	19	19	19	19	19	19	19	
38	71	65	59	55	51	47	44	41	39	36	34	32	31	29	28	27	26	24	23	22	21	20	19	19	19	19	19	19	
39	75	68	62	58	53	50	46	43	41	38	36	34	32	31	29	28	27	26	24	23	22	21	20	19	19	19	19	19	
40	79	72	66	61	56	52	49	46	43	40	38	36	34	32	31	30	29	27	26	24	23	22	21	20	19	19	19	19	
41	83	76	69	64	59	55	51	48	45	42	40	38	36	34	33	32	30	29	27	26	24	23	22	21	20	19	19	19	
42	87	80	73	67	62	58	54	50	47	44	42	40	38	36	35	33	32	30	29	27	26	24	23	22	21	20	19	19	
43	91	84	76	70	64	60	56	53	49	47	44	42	39	38	36	35	33	32	30	29	27	26	24	23	22	21	20	19	
44	96	88	80	73	67	63	59	55	52	49	46	43	41	39	38	36	35	33	32	30	29	27	26	24	23	22	21	20	
45	100	92	83	77	70	66	61	58	54	51	48	46	43	41	40	38	36	35	33	32	30	29	27	26	24	23	22	21	
46	105	96	87	80	74	69	64	60	57	54	51	48	45	43	42	40	38	36	35	33	32	30	29	27	26	24	23	22	
47	109	100	91	84	77	72	67	63	59	56	53	49	47	45	43	42	40	38	36	35	33	32	30	29	27	26	24	23	
48	114	104	95	87	80	75	70	65	61	58	55	52	50	47	45	43	42	40	38	36	35	33	32	30	29	27	26	24	
49	119	109	99	91	83	78	73	69	64	61	57	55	52	49	46	45	43	42	40	38	36	35	33	32	30	29	27	26	
50	124	113	103	95	87	81	76	71	67	63	60	57	54	51	48	46	45	43	42	40	38	36	35	33	32	30	29	27	
51	129	117	107	98	91	85	79	74	69	66	62	59	56	53	50	49	47	45	43	42	40	38	36	35	33	32	30	29	
52	134	121	111	102	95	89	83	77	72	68	65	61	58	55	53	51	49	47	45	43	42	40	38	36	35	33	32	30	
53	139	126	115	106	98	92	86	80	74	71	67	64	60	58	55	53	50	48	46	44	42	40	38	36	35	33	32	30	
54	144	131	120	110	102	95	89	83	77	73	70	66	63	60	57	54	52	50	48	46	44	42	40	38	36	35	33	32	
55	149	136	124	114	106	99	92	86	80	76	72	69	65	62	59	57	54	52	50	48	46	44	42	40	38	36	35	33	
56	155	141	129	119	110	103	96	89	83	79	75	71	68	65	62	59	56	53	51	49	47	45	43	42	40	38	36	35	
57	160	146	133	123	114	107	99	93	86	82	77	74	70	67	64	61	58	55	53	51	49	47	45	43	42	40	38	36	
58	166	151	138	127	118	110	103	96	90	85	80	76	73	69	66	63	60	57	55	53	51	49	47	45	43	42	40	38	
59	172	156	143	133	123	115	106	100	93	88	83	79	75	72	68	65	62	59	57	55	53	51	49	47	45	43	42	40	
60	178	162	148	137	128	119	110	103	97	91	86	82	78	74	70	67	64	61	58	55	53	51	49	47	45	43	42	40	
61	184	167	153	141	131	122	113	107	100	94	89	85	80	76	72	69	66	63	60	57	55	53	51	49	47	45	43	42	
62	190	173	158	145	135	125	117	110	103	97	92	87	83	79	75	72	69	66	63	60	57	55	53	51	49	47	45	43	

TABLE IV.
For Parallax. By Mr. LYONS.

Apparent Distance.																																																				
Add the Difference of the two Numbers taken out of the Table.																																																				
5	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	65	70	75	80	85	90											
"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2			
3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2			
4	4	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2			
4	4	4	4	4	3	3	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2			
5	5	5	5	5	4	4	4	4	4	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2			
5	5	5	5	5	5	4	4	4	4	4	4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3			
6	6	6	6	6	5	5	5	5	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4			
7	6	6	6	6	5	5	5	5	5	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4			
7	7	7	7	6	6	6	6	5	5	5	5	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4			
8	8	7	7	7	7	6	6	6	6	5	5	5	5	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4			
9	9	8	8	7	7	7	7	6	6	6	6	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5			
10	9	9	9	8	8	7	7	7	7	6	6	6	6	6	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5			
10	10	9	9	9	9	8	8	7	7	7	7	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6			
11	11	10	10	10	9	9	9	8	8	8	7	7	7	7	7	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6			
12	12	11	11	11	10	10	9	9	9	9	8	8	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7				
13	13	12	12	11	11	11	10	10	10	9	9	9	8	8	8	8	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7				
14	14	13	13	12	12	11	11	10	10	10	9	9	8	8	8	8	8	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7				
15	15	14	14	13	13	12	12	11	11	10	10	9	9	9	9	9	8	8	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7				
16	16	15	15	14	14	13	13	12	12	11	11	10	10	9	9	9	9	8	8	8	8	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7				
18	17	16	16	15	15	14	14	13	13	12	11	11	11	10	10	10	9	9	8	8	8	8	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7				
19	18	17	17	16	16	15	15	14	14	13	12	11	11	11	10	10	10	10	9	9	9	9	8	8	8	8	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7				
20	19	19	18	17	17																																															

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of Refraction in Seconds; which added to the observed Distance, gives the Distance cleared of Refraction. In any of the Cases mentioned above, the Effect of Refraction is less than 90° ; the Effect of Refraction may be had from the Table III. To find the Effect of Parallax.

WITH
R U L E S
Add together the proportional Logarithm of the Moon's Horizontal Parallax, the logarithmic Coscant of the Star's Altitude corrected for Refraction, and the logarithmic Sine of the Distance cleared from Refraction; the Sum being subtracted from the Index, will be the proportional Logarithm of the Distance cleared from Refraction.

TO CLEAR THE
APPARENT DISTANCE
The Index, will be the proportional Logarithm of a second

OF THE
MOON FROM A STAR,
less or greater than the second, will give the Distance corrected for the principal Effect of Parallax.

OF THE EFFECTS OF
REFRACTION AND PARALLAX.

in Table IV. in the Column marked above with the Distance, find the two Numbers answering to the Parallax in Distance, and the two Numbers answering to the second Correction of Refraction; which added to or subtracted from the Distance cleared from the Distance corrected for Refraction, will give the Distance cleared from the Effects of Refraction and Parallax.

To find the Effect of Refraction.

IN Table II. find what Number answers to the two Altitudes of the Moon and Star, the lesser of the two Altitudes being found at the Top of the Table; the other in the first Column on the left Hand.

Prefix the Index 2 to this Number (considered as the decimal Part of a Logarithm) and add it to the logarithmic Coscant of the apparent Distance of the Moon and Star; and, abating 10 from the Index of the Sum, find what natural Number answers to it in the Table of Logarithms.

From this Number subtract that corresponding to the given Distance, and to the lesser of the two Altitudes in Table II. if the Distance is less than 90° ; or add them together, if the Distance exceeds 90° ; the Remainder or Sum is the Effect

of Refraction in Seconds; which added to the observed Distance, gives the Distance cleared of Refraction.

In any of the Cases falling on the right Hand of the black waving Line, or if both Altitudes exceed 50° , the Effect of Refraction may be had at once by Table III.

To find the Effect of Parallax.

Add together the proportional Logarithm of the Moon's horizontal Parallax, the logarithmic Coscant of the Star's Altitude corrected for Refraction, and the logarithmic Sine of the Distance cleared from Refraction; the Sum, abating 20 from the Index, will be the proportional Logarithm of a first Arc.

Add together the proportional Logarithm of the Moon's horizontal Parallax, the logarithmic Coscant of the Moon's Altitude corrected for Refraction, and the Tangent of the Distance cleared from Refraction; the Sum, abating 20 from the Index, will be the proportional Logarithm of a second Arc.

Then, if the Distance is less than 90° , the Difference of these two Arcs is the principal Effect of Parallax (or Parallax in Distance); which added to or subtracted from the Distance corrected for Refraction, according as the first Arc is less or greater than the second, will give the Distance corrected for the principal Effect of Parallax.

But if the Distance exceeds 90° , the Sum of the two Arcs is to be taken instead of their Difference, and is to be subtracted from the Distance corrected for Refraction.

In Table IV. in the Column marked above with the Distance, find the two Numbers answering to the Parallax in Distance and in Altitude; their Difference is the second Correction of Parallax in Seconds; which, added to or subtracted from the Distance corrected for Refraction and principal Effect of Parallax, according as the Distance is less or greater than 90° , will give the correct or reduced Distance.

EXAMPLE

EXAMPLE II.

Let the apparent	° ' "	The Moon's horizontal	° ' "
Altitude of the	24. 48.	Parallax	56. 15
Star be		And consequently Pa-	
Of the Moon's Centre	12. 30.	rallax in Altitude,	
Observed Distance		by p. 3d of Tables,	55.
of the Moon's		is	
Centre from the	51. 28. 35		
Star			

In Table I. the Number answering to 24° and 12° of Altitude is 1411, and to 25 and 12 of Altitude is 1511; therefore 1° Increase of the greater Altitude produces an Increase of 100 in the tabular Number. Say then, by the Rule of Three, If 1° or 60' give 100, what will 48' (the Excess of the greater Altitude above 24°) give? the Answer is, 80; which, added to 1411, gives 1491, the Number corrected for exceeding Minutes of greater Altitude. Moreover, 24° and 12° of Altitude giving 1411, as above, and 24 and 13 giving 1232; therefore, 1° Increase of the lesser Altitude gives 179 Decrease of the tabular Number. Say therefore, by the Rule of Three; If 1° or 60' give 179, what will 30' (the Excess of the lesser Altitude above 12°) give? the Answer is, 89; which, subtracted from 1491 (the tabular Number corrected for exceeding Minutes of greater Altitude) leaves 1402 for the tabular Number corrected also for the exceeding Minutes of the lesser Altitude;

To which prefixing the Index 2, it will be . 2.1402
Log. Cos. observed Distance 51° 28' . 10.1066

Rejecting 10 from the Index, we have 2.2468, which is the Logarithm of 176".

In Table II. under the Column intituled 10° and above, answering to the Distance 51° is 90", and answering to 52° is 86"; therefore to 51° 28' there answers 88"; which subtracted from 176", leaves the Effect of Refraction 88".

Observed Distance	51. 28. 35
Effect of Refraction	+ 1. 28
Distance cleared of Refraction	51. 30. 3

For

For Parallax.

App. Alt. of the Star	24. 48	App. Alt. of the Moon	12. 30
Refraction in Alt. subtr.	2	Refraction in Alt. subtr.	4
Alt. corr. for Refraction	24. 46	Alt. corr. for Refraction	12. 26

Cofecant 24. 46	10.3778	Cofecant 12. 26	10.6669
Sine dist. 51. 30	9.8935	Tang. dist. 51. 30	10.0994
Proportional Log. of horizontal Paral- lax 56'. 15"	0.5051	Proportional Log. of horizontal Paral- lax 56'. 15"	0.5051
	20.9214		21.2714

Rejecting 20 from these Sums,

The Arc answering to the propor. Log. 9214 is 30. 7
1.2714 is 9. 38

Their Difference 20. 29 is the principal Effect of Parallax, or Parallax in Distance, to be subtracted; because the first Arc is greater than the second.

Distance corrected for Refraction 51. 30. 3
Parallax in Distance — 20. 29

Distance corrected for Refract. and Par. in Dist. 51. 9. 34

In Table IV. under 51°, and against 55' the Parallax in Altitude is 20"; in the same Column against 20' the Parallax in Distance is 3"; which subtracted from 20", leaves 17", for the second Correction of Parallax, to be added:

51. 9. 34
+ 17
Reduced Dist. cleared both of Refr. and Par. 51. 9. 51

N. B. The proportional Parts for the Minutes of the two Altitudes in Table I. may be found also by the Rule of Practice, or by Decimal Multiplication, as well as by the Rule of Three. Thus, to find the proportional Part answering

ing to 48', the Excess of the greater Altitude above 48°, I find, by the Rule of Practice, if 1°, or 60', give the Difference 100, 30' will give 50, 15' will give 25, and 3' will give, 5; therefore 48' will give $30 + 15 + 5 = 80$, as before. Or, by Decimal Multiplication, considering that 48' is $\frac{8}{10}$ of 60', I multiply the Difference 100 by $\frac{8}{10}$, which gives the Product 80, as before. The decimal Part any Number of Minutes is of 60', may be seen at one Corner of Table I. against the given Number of Minutes found in the Column there marked for Seconds.

EXAMPLE II.

Let apparent Alt. of the Star be	15. 25.	The Moon's horizontal Parallax	57. 3
Of the Moon's Centre	27. 30.	Whence the Parallax in Altitude, by p. 3d	51.
Ap. Dist. of the Star from the Moon's Centre	102. 30. 0		

The Number in Table I. for the Altitudes 27° and 15° is 1176, the Difference for 1° Increase of the greater Altitude being + 75, and of the lesser Altitude — 123; whence the Correction for the Excess 30' of the greater Altitude is + 37, and the Correction for the Excess 25' of the lesser Altitude is — 51.

Whence the Number from Table I. corrected, is
 $1176 + 37 - 51 = 1162$, or prefixing the Index 2, is 2.1162
 Coscant of Dist. 102°. 30' = Coscant 77°. 30', 10.0104
 the Supplement to 180° 12.1266

Rejecting 10 from the Index is Log. of 134
 Number in Table II. to be added, because Distance is above 90° + 25

Effect of Refraction 159 = 2'. 39"
 Observed Distance 102. 30. 0
 Effect of Refraction + 2. 39
 Distance cleared of Refraction 102. 32. 39

For Parallax.

Prop. Log. of horiz. } Parallax 57'. 3" } 0.4990	Propor. Log. of the } Moon's hor. Par. } 0.4990
Cofec. of the Star's } app. Alt. 15°. 25' } 10.5768	Cofec. of the Moon's } app. Alt. 27°. 30' } 10.3356
— Refract. 3' = } 15°. 22' }	— Refract. 2' = } 27°. 28' }
Sine Dist. cleared of } Refract. 102°. 33' } 9.9895	Tang. Dist. clear of } Refract. 102°. 33' } 10.6524
or 77°. 27', its } Supplem. to 180° }	or 77°. 27', its } Supplem. to 180° }
Prop. Log. of 15. 32 } or Arc 1st } 20.0653	Prop. Log. of 5'. 52" } or Arc 2d . . . } 1.4870
Arc 2d to } be add- } ed, be- } cause } Dist. is } above } 90° } + 5. 52	
Principal } Effect } of Par. } 21. 24	
or Par. } in Dist. }	
In Table IV. Parallax in Altitude 51 gives 5	
Parallax in Distance 21, 1	
Difference 4	
Distance cleared of Refraction 102. 32. 39	
Parallax in Distance to be substracted, because } Distance is above 90° } — 21. 24	
102. 11. 15	
Second Correction of Parallax to be substracted, } because Distance is above 90° } — 4	
Distance reduced, or cleared both of Refraction } and Parallax } 102. 11. 11	

EXAMPLE

EXAMPLE III.

Let app. Alt. of the Star be	$\left. \begin{array}{l} 48. 20. \\ 64. 30. \\ 33. 15. \end{array} \right\}$	"	The horizontal Parallax	$\left. \begin{array}{l} 0. 55. 29 \\ 0. 23. \end{array} \right\}$
Of the Moon			Whence the Par. in Altitude	
The observed Dist.			The Star's Alt. corrected by Refr.	$\left. \begin{array}{l} 48. 19. \\ 64. 30. \end{array} \right\}$
Effect of Refract. by Table III.	$\left. \begin{array}{l} + 0. 34 \\ 33. 15. 34 \end{array} \right\}$		The Moon's Alt. corr. by Refr.	
Distance cleared of Refraction				
Prop. Log. hor. Par.	0.5111		Prop. Log. hor. Par.	0.5111
Cofecant of the Star's Alt. corrected by Refract. $48^{\circ}. 19'$	$\left. \begin{array}{l} 10.1268 \\ 9.7392 \end{array} \right\}$		Cofec. of the Moon's Alt. corrected by Refract. $64^{\circ}. 30'$	$\left. \begin{array}{l} 10.0445 \\ 9.8169 \end{array} \right\}$
Sine Dist. $33^{\circ}. 16'$			Tang. Dist. $33^{\circ}. 16'$	
				$\underline{20.3725}$
Prop. Log. Arc first $75'. 32''$	$\left. \begin{array}{l} 20.3771 \\ 76. 20 \\ 75. 32 \end{array} \right\}$		Prop. Log. Arc 2d	
			Arc first	$\underline{75. 32}$
			Par. in Dist.	0. 48

Table IV. Parallax in Altitude 23 gives 7	
Parallax in Distance	$\underline{0}$
Second Correction of Parallax	7
Distance cleared of Refraction	$\left. \begin{array}{l} 33. 15. 34 \\ + 0. 48 \end{array} \right\}$
Parallax in Distance	
	$\underline{33. 16. 22}$
Second Correction of Parallax	$\underline{+ 7}$
Distance reduced	$\underline{33. 16. 29}$

EXAMPLE IV.

Let the app. Alt. of the Star be	$\left. \begin{array}{l} 53. 13 \\ 64. 38 \end{array} \right\}$	The Moon's horizontal Parallax	$\left. \begin{array}{l} 61. 9 \\ 26. 0 \end{array} \right\}$
Of the Moon		Whence the Moon's Parallax in Altitude	
The app. Distance	$56. 17. 44$		
Table III.	$+ 1. 1$		
Distance cleared of Refraction	$56. 18. 45$		
Propor. Log. of the Moon's horizontal Parallax $61'. 9''$	$\left. \begin{array}{l} 0.4689 \\ 10.0965 \end{array} \right\}$	Propor. Log. of the Moon's horizontal Parallax $61'. 9''$	$\left. \begin{array}{l} 0.4689 \\ 10.0440 \end{array} \right\}$
Cofecant of the Star's Alt. corrected by Refract. $53^{\circ}. 12'$		Cofec. of the Moon's Altitude corrected $64^{\circ}. 38'$	
Sine Dist. cleared of Refract. $56^{\circ}. 19'$	$\left. \begin{array}{l} 9.9202 \\ 20.4856 \end{array} \right\}$	Tang. Dist. cleared of Refr. $56^{\circ}. 19'$	$\left. \begin{array}{l} 10.1762 \\ 20.6891 \end{array} \right\}$
Prop. Log. of $58. 50$ or first Arc		Prop. Log. of $35'. 50''$ or second Arc	
Second Arc $36. 50$			
Par. in Dist. $22. 0$			
Table IV. Parallax in Altitude 26 gives	4		
Parallax in Distance 22	3		
Second Correction of Parallax	1		
Distance cleared of Refraction	$56. 18. 45$		
Parallax in Distance	$22. 0$		
Second Correction of Parallax	1		
Distance cleared of Refraction and Parallax	$55. 56. 46$		

REMARKS.

REMARKS.

I. In computing the Effect of Refraction, three Places of Figures, besides the Index, will generally be sufficient for Table I. but for finding the Effect of Parallax, the Sines &c. ought to be taken to four Places of Figures, besides the Index.

II. Sherwin's Logarithms are the most convenient and exact for these and other Calculations; but if a Set of Logarithms be used, having no Cosecants, they are easily found, by taking the Complement of the logarithmic Sine to 20.0000. Thus, to find the Cosecant of $48^{\circ} 19'$, subtract its logarithmic Sine 9.8732 from 20.0000, the Remainder 10.1268 is the Cosecant required, as above in Example III.

III. If the Index of the proportional Logarithm of Arc first or second for Parallax come out 19, so that 20 cannot be thrown off, add 0.3010, or the Logarithm of 2 to the Sum of the Logarithms, and then abating 20 from the Index, find what Number it answers to in the Table of proportional Logarithms; which doubled, gives Arc the first or second.

IV. If the Moon's Distance was taken from the Sun instead of a Star, for Star read Sun in the preceding Rules.

SUPPLEMENTAL
T A B L E S

TO BE USED FOR CORRECTING

THE II^D AND III^D TABLES

F O R

R E F R A C T I O N ,

AND FOR FINDING THE EFFECT OF THE

S U N ' S P A R A L L A X ,

WHERE IT IS REQUIRED TO HAVE

THE RESULT TRUE TO A SECOND.

BY MR. LYONS.

Shewing what Number of Seconds is to be substracted from the Number in Table II. on account of the greater Altitude of the Moon or Star, when under 30° .

		Greater Altitude of the Moon or Star.															
Distance.	°	5	6	7	8	9	10	11	12	13	14	15	16	17			
		"	"	"	"	"	"	"	"	"	"	"	"	"			
10	28	21	16	13	10	8	7	6	5	4	4	3	3	3			
11	26	19	15	12	9	8	6	5	5	4	4	3	3	3			
12	23	17	14	11	8	7	6	5	4	3	3	3	3	3			
13	22	16	13	10	8	6	6	5	4	3	3	3	3	3			
14	20	14	12	9	7	6	5	4	4	3	3	3	3	2			
15	19	13	11	9	7	6	5	4	3	3	3	3	3	2			
16	17	13	10	8	6	5	5	4	3	3	3	3	3	2			
17	16	12	9	8	6	5	4	4	3	3	3	3	3	2			
18	15	11	9	7	5	4	4	3	3	2	2	2	2	2			
19	14	10	8	7	5	4	3	3	3	2	2	2	2	2			
20	14	10	8	6	5	4	3	3	3	2	2	2	2	2			
21	13	10	8	6	5	4	3	3	3	2	2	2	2	2			
22	12	9	7	6	4	4	3	3	3	2	2	2	2	2			
23	12	9	7	5	4	4	3	2	2	2	2	2	2	1			
24	11	8	6	5	4	3	3	2	2	2	1	1	1	1			
25	11	8	6	5	4	3	3	2	2	2	1	1	1	1			
26	10	7	6	5	4	3	3	2	2	2	1	1	1	1			
27	10	7	6	5	4	3	3	2	2	2	1	1	1	1			
28	9	7	5	4	3	3	2	2	2	1	1	1	1	1			
29	9	7	5	4	3	3	2	2	2	1	1	1	1	1			
30	9	6	5	4	3	3	2	2	2	1	1	1	1	1			
35	7	5	4	3	3	2	2	2	1	1	1	1	1	1			
40	6	4	3	3	2	2	2	2	1	1	1	1	1	1			
45	5	4	3	2	2	1	1	1	1	1	1	1	1	1			
50	4	3	2	2	1	1	1	1	1	1	1	1	1	0			
55	3	2	2	2	1	1	1	1	1	1	0	0	0	0			
120	60	3	2	2	1	1	1	1	1	1	0	0	0	0			
110	70	2	1	1	1	1	0	1	0	0	0	0	0	0			
100	80	1	1	0	0	0	0	0	0	0	0	0	0	0			
90	90	0	0	0	0	0	0	0	0	0	0	0	0	0			

Shewing what Number of Seconds is to be subſtracted from the Number in Table II. on account of the greater Altitude of the Moon or Star, when under 30° .

[illegible]

TABLE II. Supplemental, continued, [33]

Shewing what Number of Seconds is to be added to the Number in Table II. standing under 10 Degrees, when the lesser Altitude is above 10 Degrees.

Distance.	Lesser Altitude of the Moon or Star.									
	°	°	°	°	°	°	°	°	°	°
	21	22	23	24	25	26	27	28	29	30 & above
°	"	"	"	"	"	"	"	"	"	"
10	6	7	7	7	7	7	7	7	7	7
11	6	6	6	6	6	6	6	7	7	7
12	5	5	6	6	6	6	6	6	6	6
13	5	5	5	5	5	5	5	6	6	6
14	4	5	5	5	5	5	5	5	5	5
15	4	4	4	4	4	4	5	5	5	5
16	4	4	4	4	4	4	4	5	5	5
17	4	4	4	4	4	4	4	4	4	4
18	3	3	4	4	4	4	4	4	4	4
19	3	3	3	3	3	3	3	4	4	4
20	3	3	3	3	3	3	3	3	3	3
21	3	3	3	3	3	3	3	3	3	3
22	3	3	3	3	3	3	3	3	3	3
23	3	3	3	3	3	3	3	3	3	3
24	2	3	3	3	3	3	3	3	3	3
25	2	2	2	2	2	2	3	3	3	3
26	2	2	2	2	2	2	3	3	3	3
27	2	2	2	2	2	2	2	3	3	3
28	2	2	2	2	2	2	2	2	2	2
29	2	2	2	2	2	2	2	2	2	2
30	2	2	2	2	2	2	2	2	2	2
35	1	2	2	2	2	2	2	2	2	2
40	1	1	1	1	1	1	1	2	2	2
45	1	1	1	1	1	1	1	1	1	1
50	1	1	1	1	1	1	1	1	1	1
55	1	1	1	1	1	1	1	1	1	1
60	1	1	1	1	1	1	1	1	1	1
70	0	0	0	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0	0	0	0
90	0	0	0	0	0	0	0	0	0	0

[34]

TABLE III. Supplemental.

This Table, jointly with the following, is for finding the
Correction of Table III.

This Table gives the Number for entering the first upright
Column of the following Table.

Alt.	50	51	52	53	54	55	56	57	58	59	60	61
0	"	"	"	"	"	"	"	"	"	"	"	"
50	0	"	"	"	"	"	"	"	"	"	"	"
51	0	0	"	"	"	"	"	"	"	"	"	"
52	0,1	0	0	"	"	"	"	"	"	"	"	"
53	0,1	0,1	0	0	"	"	"	"	"	"	"	"
54	0,2	0,1	0,1	0	0	"	"	"	"	"	"	"
55	0,3	0,2	0,2	0,1	0,1	0	"	"	"	"	"	"
56	0,4	0,3	0,3	0,2	0,1	0,1	0	"	"	"	"	"
57	0,5	0,4	0,4	0,3	0,2	0,1	0,1	0	"	"	"	"
58	0,6	0,5	0,4	0,4	0,3	0,2	0,1	0,1	0	"	"	"
59	0,8	0,6	0,5	0,4	0,3	0,2	0,2	0,1	0,1	0	"	"
60	0,9	0,7	0,6	0,5	0,3	0,2	0,2	0,1	0,1	0	0	"
61	1,0	0,9	0,7	0,6	0,4	0,3	0,2	0,2	0,2	0,1	0,1	0
62	1,2	1,0	0,8	0,6	0,5	0,3	0,2	0,2	0,2	0,1	0,1	0
63	1,3	1,1	0,9	0,7	0,6	0,4	0,3	0,3	0,2	0,1	0,1	0,1
64	1,5	1,3	1,1	0,9	0,7	0,5	0,4	0,3	0,3	0,2	0,1	0,1
65	1,6	1,4	1,2	1,0	0,8	0,6	0,5	0,4	0,3	0,2	0,1	0,1
66	1,8	1,6	1,4	1,1	0,9	0,7	0,6	0,5	0,3	0,2	0,1	0,1
67	1,9	1,7	1,5	1,2	1,0	0,8	0,7	0,6	0,4	0,3	0,2	0,2
68	2,1	1,9	1,6	1,4	1,1	0,9	0,8	0,7	0,5	0,4	0,3	0,2
69	2,2	2,0	1,7	1,5	1,2	1,0	0,9	0,7	0,6	0,4	0,3	0,3
70	2,4	2,1	1,8	1,6	1,3	1,1	1,0	0,8	0,7	0,5	0,4	0,3
71	2,5	2,2	2,0	1,7	1,5	1,2	1,1	0,9	0,8	0,6	0,5	0,4
72	2,7	2,4	2,1	1,9	1,6	1,3	1,1	1,0	0,8	0,7	0,5	0,4
73	2,8	2,5	2,2	2,0	1,7	1,4	1,2	1,1	0,9	0,8	0,6	0,5
74	3,0	2,7	2,4	2,1	1,8	1,5	1,3	1,1	1,0	0,8	0,6	0,5
75	3,1	2,8	2,5	2,2	1,9	1,6	1,4	1,2	1,1	0,9	0,7	0,6
76	3,2	2,9	2,6	2,3	2,0	1,7	1,5	1,3	1,2	1,0	0,8	0,7
77	3,3	3,0	2,7	2,4	2,1	1,8	1,6	1,4	1,2	1,0	0,8	0,7
78	3,4	3,1	2,8	2,4	2,1	1,8	1,6	1,4	1,3	1,1	0,9	0,8
79	3,5	3,2	2,9	2,5	2,2	1,9	1,7	1,5	1,3	1,1	0,9	0,8
80	3,6	3,3	2,9	2,6	2,3	2,0	1,8	1,6	1,4	1,2	1,0	0,8
81	3,7	3,4	2,9	2,6	2,3	2,0	1,8	1,6	1,4	1,2	1,0	0,9
82	3,8	3,5	3,0	2,7	2,4	2,1	1,9	1,6	1,4	1,3	1,1	0,9
83	3,9	3,5	3,1	2,7	2,4	2,1	1,9	1,6	1,4	1,3	1,1	1,0
84	4,0	3,6	3,2	2,8	2,5	2,2	2,0	1,7	1,5	1,4	1,2	1,0
85	4,0	3,6	3,2	2,8	2,5	2,2	2,0	1,8	1,5	1,4	1,2	1,0
90	4,1	3,7	3,3	2,9	2,6	2,3	2,1	1,9	1,6	1,4	1,2	1,1

TABLE III. Supplemental, continued. [35]

This Table, jointly with the following, is for finding the Correction of Table III.

This Table gives the Number for entering the first upright Column of the following Table.

Alt.	62	63	64	65	66	67	68	69	70	75	80	85	90
50													
51													
52													
53													
54													
55													
56													
57													
58													
59													
60													
61	//												
62	0	//											
63	0	0	//										
64	0	0	0	//									
65	0,1	0	0	0	//								
66	0,1	0	0	0	0	//							
67	0,1	0,1	0	0	0	0	//						
68	0,2	0,1	0	0	0	0	0	//					
69	0,2	0,2	0,1	0,1	0,1	0	0	0	//				
70	0,3	0,2	0,2	0,1	0,1	0,1	0	0	0	//			
71	0,3	0,3	0,2	0,1	0,1	0,1	0	0	0	0	//		
72	0,4	0,3	0,3	0,2	0,2	0,1	0,1	0	0	0	0	//	
73	0,4	0,4	0,3	0,2	0,2	0,1	0,1	0	0	0	0	0	//
74	0,5	0,4	0,3	0,3	0,3	0,2	0,2	0,1	0,1	0	0	0	0
75	0,5	0,4	0,4	0,3	0,3	0,2	0,2	0,1	0,1	0	0	0	0
76	0,6	0,5	0,4	0,3	0,3	0,2	0,2	0,1	0,1	0	0	0	0
77	0,6	0,5	0,4	0,3	0,3	0,2	0,2	0,1	0,1	0	0	0	0
78	0,7	0,6	0,5	0,4	0,3	0,3	0,2	0,1	0,1	0	0	0	0
79	0,7	0,6	0,5	0,4	0,3	0,3	0,2	0,1	0,1	0	0	0	0
80	0,7	0,6	0,5	0,4	0,3	0,3	0,2	0,1	0,1	0	0	0	0
81	0,7	0,6	0,5	0,4	0,3	0,3	0,2	0,1	0,1	0	0	0	0
82	0,8	0,7	0,6	0,4	0,3	0,3	0,2	0,1	0,1	0	0	0	0
83	0,8	0,7	0,6	0,5	0,4	0,4	0,3	0,2	0,2	0,1	0	0	0
84	0,8	0,7	0,6	0,5	0,4	0,4	0,3	0,2	0,2	0,1	0	0	0
85	0,8	0,7	0,6	0,5	0,4	0,4	0,3	0,2	0,2	0,1	0	0	0
90	0,9	0,8	0,7	0,6	0,5	0,5	0,4	0,3	0,2	0,1	0	0	0

[36]

TABLE IV. Supplemental.

For finding the Correction to be added to Table III. where both Altitudes are above 50 Degrees.

N ^o found by preceding Table	Distance.																												
	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29									
//	//	//	//	//	//	//	//	//	//	//	//	//	//	//	//	//	//	//	//	//	//								
O,1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0								
O,2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0								
O,3	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1								
O,4	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1								
O,5	3	3	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1								
O,6	3	3	3	3	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1								
O,7	4	4	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	1	1								
O,8	5	4	4	4	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2								
O,9	5	5	4	4	4	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2								
I,0	6	5	5	4	4	4	4	3	3	3	3	3	3	3	2	2	2	2	2	2	2								
I,1	6	6	5	5	5	4	4	4	4	3	3	3	3	3	3	3	2	2	2	2	2								
I,2	-	6	6	5	5	5	4	4	4	4	3	3	3	3	3	3	3	3	3	3	2								
I,3	-	-	6	6	5	5	5	4	4	4	4	4	3	3	3	3	3	3	3	3	3								
I,4	-	-	-	6	6	5	5	5	5	4	4	4	4	4	3	3	3	3	3	3	3								
I,5	-	-	-	-	7	6	6	5	5	5	4	4	4	4	4	4	3	3	3	3	3								
I,6	-	-	-	-	-	6	6	5	5	5	5	4	4	4	4	4	4	4	3	3	3								
I,7	-	-	-	-	-	7	7	6	6	5	5	5	5	4	4	4	4	4	4	4	3								
I,8	-	-	-	-	-	-	7	6	6	6	6	5	5	5	4	4	4	4	4	4	4								
I,9	-	-	-	-	-	-	-	7	6	6	6	6	5	5	5	5	4	4	4	4	4								
2,0	-	-	-	-	-	-	-	7	7	6	6	6	6	5	5	5	5	4	4	4	4								
2,1	-	-	-	-	-	-	-	-	7	7	6	6	6	6	5	5	5	5	4	4	4								
2,2	-	-	-	-	-	-	-	-	-	7	7	6	6	6	6	5	5	5	5	5	4								
2,3	-	-	-	-	-	-	-	-	-	-	7	7	6	6	6	6	5	5	5	5	5								
2,4	-	-	-	-	-	-	-	-	-	-	-	7	7	6	6	6	6	5	5	5	5								
2,5	-	-	-	-	-	-	-	-	-	-	-	-	7	7	6	6	6	5	5	5	5								
2,6	-	-	-	-	-	-	-	-	-	-	-	8	7	7	7	6	6	6	6	6	6								
2,7	-	-	-	-	-	-	-	-	-	-	-	-	8	7	7	7	6	6	6	6	6								
2,8	-	-	-	-	-	-	-	-	-	-	-	-	-	7	7	7	6	6	6	6	6								
2,9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	7	7	6	6	6	6								
3,0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	7	7	6	6	6								
3,1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	7	7	7	7								
3,2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	7	7	7								
3,3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	7	7								
3,4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	7								
3,5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7								
3,6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
3,7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
3,8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
3,9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
4,0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
4,1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								

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both

		Distance.																							
		Apparent Distance of the Sun and Moon.																							
		No found by preceding Table.																							
		30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	50	55	60 & above					
		11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11					
0	0	0,1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
0	0	0,2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
1	1	0,3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1					
1	1	0,4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1					
1	1	0,5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1					
1	1	0,6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1					
1	1	0,7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1					
2	2	0,8	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2					
2	2	0,9	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2					
2	2	1,0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2					
2	2	1,1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2					
3	2	1,2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2					
3	3	1,3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3					
3	3	1,4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3					
3	3	1,5	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3					
3	3	1,6	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3					
4	3	1,7	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3					
4	4	1,8	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4					
4	4	1,9	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4					
4	4	2,0	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4					
4	4	2,1	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4					
5	5	2,2	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4					
5	5	2,3	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5					
5	5	2,4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5					
5	5	2,5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5					
6	5	2,6	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5					
6	6	2,7	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5					
6	6	2,8	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6					
6	6	2,9	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6					
6	6	3,0	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6					
7	6	3,1	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6					
7	7	3,2	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6					
7	7	3,3	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7					
7	7	3,4	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7					
7	7	3,5	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7					
7	7	3,6	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7					
7	7	3,7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7					
7	7	3,8	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7					
7	7	3,9	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7					
7	7	3,0	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7					
7	7	3,1	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7					

for finding the

THE UNIVERSITY OF CHICAGO

TABLE VI. Supplemental.

For the Effect of the Sun's Parallax.

[illegible]

EXPLICATION

OF THE USE OF THE

SUPPLEMENTAL TABLES.

THESE Tables are only necessary to be used where the utmost Accuracy is required; and therefore may very well be omitted in common Practice, since the Effect of them will never amount to $10''$ (and generally much less) if the greater of the two Altitudes of the Moon and Star be 10° or above, as it can scarcely ever be less. Their Titles almost sufficiently explain their Use: nevertheless, it may be proper to add the following Directions concerning them.

Tables I. and II. Supplemental, are to be both used in correcting Table II. of Refraction. Enter Table I. Supplemental with greater Altitude of the Moon or Star at Top, and Distance on the Side, the corresponding Number of Seconds is to be subtracted from that taken out of Table II. of Refraction. Then enter Table II. Supplemental with lesser Altitude of the Moon or Star at Top, and Distance on the Side, the corresponding Number of Seconds added to Number in Table II. of Refraction, first already corrected for Table I. Supplemental, gives the Number in Table II. of Refraction corrected, which must be applied as before.

Note. That when the utmost Accuracy is required, Tables I. and II. of Refraction are to be used together with the two first supplemental Tables, if one or both Altitudes are under 50° , as well in the Cases falling to the right Hand of the black waving Line as in the rest of the Table; and Table III. of Refraction is only to be used, where both Altitudes are above 50° . In this Case, and this Case only, Tables III. and IV. Supplemental are to be used for correcting Table III. of Refraction. Enter Table III. Supplemental with lesser Altitude

titude of the Moon or Star at the Top, and greater Altitude on the Side, and take out the corresponding Number; with which enter Table IV. Supplemental on the Side, and entering the same Table with the Distance on the Top, the corresponding Number of Seconds is the Correction to be added to Table III. of Refraction.

The two last Tables, or V. and VI. Supplemental, serve for correcting the observed Distance of the Moon from the Sun, on account of the Sun's Parallax; their joint Effect cannot exceed 9". Enter Table V. Supplemental with the Moon's Altitude on the Side, and the Distance at the Top; and enter Table VI. Supplemental with the Sun's Altitude on the Side, and Distance at the Top. The two Numbers so taken out, applied with their proper Signs respectively, according to the Directions indicated by the Tables, to the Distance already corrected by the preceding Tables and Rules, give the Distance further corrected on account of the Sun's Parallax.

Here follow the four Examples wrought before, according to the four principal Tables, corrected by the supplemental Tables.

EXAMPLE I. corrected.

The greater Altitude, namely that of the Star, being $24^{\circ}.48'$, and the Distance $51\frac{1}{2}^{\circ}$, the Correction of Table II. Supplemental is 0; the lesser Altitude, namely of the Moon, being $12^{\circ}.30'$, and the Distance $51\frac{1}{2}^{\circ}$, Table II. Supplemental also gives 0; so that the Number found by Table II. of Refraction, and consequently the Effect of Refraction, as found before, appears to be exact, without needing any further Correction.

Suppose now, that, instead of a Star, it had been the Sun, from which this Distance of the Moon was taken. Entering Table V. Supplemental with the Moon's Altitude $12\frac{1}{2}^{\circ}$ on the Side, and Distance $51\frac{1}{2}^{\circ}$ at the Top, the corresponding Number of Seconds is $2''$, to be subtracted. In like Manner entering Table VI. with the Sun's Altitude $24^{\circ}.48'$ on the Side, and Distance $51\frac{1}{2}^{\circ}$ at Top, the Number of Seconds comes out $3''$, to be added. Therefore $51^{\circ}.9'.51'' - 2'' + 3'' = 51^{\circ}.9'.52''$, the reduced Distance correct.

EXAMPLE II. corrected.

The greater Altitude, namely that of the Moon, being $27\frac{1}{2}^{\circ}$, and the Distance $102\frac{1}{2}^{\circ}$, Table I. Supplemental gives 0; the lesser Altitude, namely that of the Star, being $15^{\circ} 25'$, and the Distance as before $102\frac{1}{2}^{\circ}$; Table II. also gives 0; whence the Effect of Refraction found before is exact.

Suppose now, that this had been the Moon's Distance from the Sun, instead of a Star, to correct the Distance further for the Effect of the Sun's Parallax, entering Table V. with $28^{\circ} 19'$, the Moon's Altitude corrected both for Refraction and Parallax, and $102^{\circ} 11'$, the Distance corrected, you find $4''$, to be subtracted. Entering Table VI. Supplemental with the Sun's Altitude $15^{\circ} 22'$, and Distance $102^{\circ} 11'$, you find $0''$; whence $102^{\circ} 11' 11'' - 4'' = 102^{\circ} 11' 7''$, the Distance of the Moon from the Sun reduced or finally corrected.

EXAMPLE III. corrected.

One of the Altitudes, namely that of the Moon being under 50° . This Case, though falling to the right-hand Side of the black waving Line, must not be computed by Table III. but by Tables I. and II. of Refraction, corrected by Tables I. and II. Supplemental; because the utmost Accuracy is supposed to be required.

Table I. gives $0641 + 2 - 6 = 0637$, to which }
 prefix the Index 2, it is } 2.0637
 Coscant Distance $33^{\circ} 15'$ } 10.2610
 Logarithm of 211 } 12.3247

The Number in Table II. in the Column intituled 10° and above, to Distance 33° being $174''$, and to Distance 34° , being $167''$, to $33^{\circ} 14'$, there will answer $172''$; but this must be corrected by Tables I. and II. Supplemental.

The greater Altitude being above 30° , Table I. Supplemental gives 0; the lesser Altitude being above 30° , and the Distance being 33° , Table II. gives $2''$, to be added to $172''$, makes $174''$, to be subtracted from $211''$, the Remainder $37''$ is the Effect of Refraction to be added to the observed Distance $33^{\circ} 15' 0''$ gives the Distance cleared of Refraction $33^{\circ} 15' 37''$, or $3''$ greater than found before by the applying Table III. only. The Calculation of the Effect of Parallax

Parallax will not be altered hereby, so that the reduced Distance will come out $3''$ greater than before, or $33^{\circ}. 16'. 32''$.

Suppose now the Distance was that of the Moon from the Sun, and not from a Star, to find the Effect of the Sun's Parallax, the Moon's Altitude corrected for Refraction and Parallax being $64^{\circ}. 53'$, and the Distance above corrected $33^{\circ}. 16'$, Table V. Supplemental gives $15''$, to be subtracted; and the Sun's Altitude corrected being $48^{\circ}. 19'$, Table VI. Supplemental gives $10''$, to be added. Therefore $33^{\circ}. 16'. 32'' - 15'' + 10'' = 33^{\circ}. 16'. 27''$, the reduced or correct Distance of the Moon from the Sun.

EXAMPLE IV. corrected.

Table III. Supplemental answering to the Altitude 65° and 53° , gives $1'', 0$; with which entering Table IV. Supplemental on the Side, and with the Distance 56° at the Top, there will be found $1''$, to be added to $61''$, the Number found by Table III. or it will come to the same thing, if it be added to the Distance above cleared of Refraction and Parallax, viz. $55^{\circ}. 56'. 46''$; whence the Distance further corrected will be $55^{\circ}. 56'. 47''$.



INVESTIGATION

OF THE

TABLES

AND

RULES

FOR FINDING THE EFFECT OF

REFRACTION

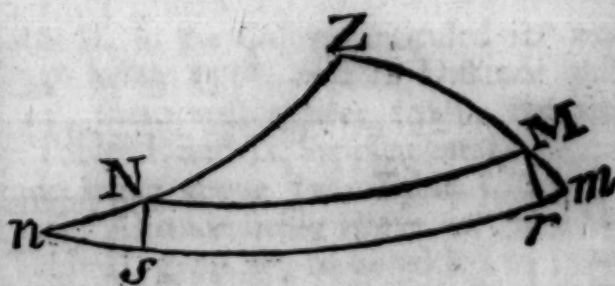
AND

PARALLAX

UPON THE

MOON'S DISTANCE FROM A STAR.

LET Z be the Zenith, M the Moon, its Alt. $= \mu$, N the Star, its Altitude $= \nu$, Sine $\mu = M$, Cofine $\mu = m$, Sine $\nu = N$, Cofine $\nu = n$, Distance $MN = \delta$, its Sine $= D$, and Cofine $= d$, Radius $= 1$. Putting μ to express the Refraction in Altitude Mm at the Altitude μ , and ν the Refraction in Altitude Nn at the Altitude ν , and drawing the Arches Ns , Mr perpendicular to the true Distance mn , the Distance is contracted by Refraction, by the Quantity



Quantity $n\dot{r} + m\dot{r} = Nn \times \text{Cof. } n + Mm \times \text{Cof. } m = \dot{r}$
 $\times \frac{M - dN}{Dn} + \mu \times \frac{N - dM}{Dm} = \frac{1}{D} \times \frac{M\dot{r}}{n} + \frac{N\mu}{m} - \frac{d}{D}$
 $\times \frac{N\dot{r}}{n} + \frac{M\mu}{m}.$

The Logarithms of $\frac{M\dot{r}}{n} + \frac{N\mu}{m}$ are contained in Table I. to which the logarithmic Cosecant of the Distance, or the Logarithm of $\frac{1}{D}$ being added, the Sum is the Logarithm of the Quantity $\frac{1}{D} \times \frac{M\dot{r}}{n} + \frac{N\mu}{m}$, or the first Part of the Formula above.

As the greater of the two Altitudes (suppose μ) can scarcely be less than 10° , $\frac{M\mu}{m}$ may be considered as a constant Quantity $= 57''$, the Refraction at the Altitude of 45° , which put $= e$; for, according to Dr. Bradley's Rule, $\mu = 57'' \times \text{Cotang. } \mu + 3\mu = 57'' \times \frac{m}{M}$ nearly, when μ is 10° or more, and consequently $\frac{M\mu}{m} = 57'' = e$, whence the second

Part of the Formula $\frac{d}{D} \times \frac{N\dot{r}}{n} + \frac{M\mu}{m} = \frac{d}{D} \times \frac{N\dot{r}}{n} + e$ very nearly, $\dot{r}$ being taken as the lesser Altitude, the Values of which Expression are contained in Table II.

Supposing the Refraction in Altitude to be accurately as the Tangents of the Zenith Distances, as they are very nearly for Altitudes above 10° , $\mu = \frac{em}{M}$ and $\dot{r} = \frac{en}{N}$, which substituted in the general Formula, it becomes $\frac{1}{D} \times \frac{eM}{N} + \frac{eN}{M} - \frac{d}{D} \times 2e$, and substituting for the Cotang. $\frac{d}{D}$ it is equal $\frac{1}{D} - t$, t being the Tangent of Half the Distance, or $\frac{1}{2} \delta$, the general Formula is reduced to the following Expression, $\frac{e}{D} \times \frac{M}{N} + \frac{N}{M} - 2 + 2et = 2et + \frac{e}{D} \times \frac{M - N|^2}{MN}.$

If

If both Altitudes are above 50° , the Quantity $\frac{e}{D} \times \frac{M-N}{MN}$ will never exceed $8''$; and therefore the Effect of Refraction may be taken $= 2ct$, the Values of which are contained in Table III.

The Case is the same with respect to all the Places falling to the right Hand of the black wavy Line in Table I. which therefore will also be found at once by Table III.

When the utmost Accuracy is required, some small Corrections must be made to Tables I, II, and III. of Refraction, these are contained in the four first supplemental Tables, and are readily to be taken out at Sight. The Foundation of them is as follows: μ being $= e \times \text{Cotang. } \mu + 3\mu = e$

$\times \frac{m}{M} - \frac{3\mu}{M^2}$, nearly $=$ (or for μ substituting its approximate

Value $\frac{em}{M}$, $= e \times \frac{m}{M} - \frac{3em}{M^2}$, it is plain that $\frac{M\mu}{m} = e - \frac{3e^2}{M^2}$.

In like Manner $\frac{N\mu}{n} = e - \frac{3e^2}{N^2}$. Whence $\frac{d}{D} \times \frac{N\mu}{n} + \frac{M\mu}{m}$, the second Part of the general Formula, may be taken for Altitudes above 10° , very accurately, to be $= \frac{d}{D}$

$\times 2e - \frac{3e^2}{M^2} - \frac{3e^2}{N^2}$. But the Numbers in Table II. standing

in the last Column, intituled 10° and above, are $= \frac{d}{D} \times 112''.5$,

and the Expression just found above is $= \frac{d}{D} \times 114'' - \frac{3e^2}{M^2} - \frac{3e^2}{N^2}$,

which is greater than $\frac{d}{D} \times 112''.5$ by $\frac{d}{D} \times 1''\frac{1}{2} - \frac{3e^2}{M^2} - \frac{3e^2}{N^2}$.

This Correction, therefore, must be applied to the Number taken out of the last Column of Table II. This may be re-

solved into two Parts, $\frac{d}{D} \times 1''\frac{1}{2} - \frac{3e^2}{N^2}$ and $-\frac{d}{D} \times \frac{3e^2}{M^2}$.

The first Part is contained in the second supplemental Table, the other Part in the first supplemental Table: Only when the greater Altitude is under 10° , the Correction

$-\frac{d}{D} \times \frac{3e^2}{M^2}$ being not quite exact, the Correction in that

Case

Cafe was found from the Formula $-\frac{d}{D} \times 57'' - \frac{M \mu}{m}$; for it is plain that this Quantity added to $\frac{d}{D} \times \frac{N \nu}{n} + 57''$, the Quantity standing in the last Column of Table II. makes $\frac{d}{D} \times \frac{N \nu}{n} + \frac{M \mu}{m}$ the second Part of the general Formula.

It has been shewn above, that when both Altitudes are considerable the Effect of Refraction $= 2et + \frac{e}{D} \times \frac{M - N^2}{MN}$, the principal Part $2et$ being contained in Table III. the other Part serves as a Correction to it; the third supplemental Table contains the Values of $e \times \frac{M - N^2}{MN}$, and the fourth supplemental Table serves to multiply this last Quantity by $\frac{1}{D^2}$, or the Coscant of the Distance, in order to obtain the required Correction of Table III. of Refraction.

Investigation of the two Rules for finding the Effect of PARALLAX.

Let k = horizontal Parallax; then $Mm = hm$, and $Mr = Mm \times \text{Cof. } M$
 $= hm \times \frac{N - dM}{Dm} = \frac{Nh}{D}$
 $-\frac{k d M}{D} = \text{horizontal Parallax} \times \text{Sine of the Star's Altitude} \times \text{Cofec. Dist.}$
 $-\text{horizontal Parallax} \times \text{Sine of the Moon's Alt.} \times \text{Cotang. Distance.}$



The Effect of the Sun's Parallax might be found in the same Manner; but being very small, is conveniently thrown into two short Tables, the Vth and VIth supplemental ones.

Table IV. for Parallax contains the Product of the Versines of the Number of Minutes contained in the first Column, and the Cotangent of the Numbers at the Top of the Table, reduced into Seconds.

The

The Difference of the two Numbers taken out of this Table expresses the Quantity of the second Correction of Parallax, delivered in the Preface to the British Mariner's Guide; for the Investigation of which, see Philosophical Transactions, Vol. LIV. p. 273. for the Year 1764.

N. B. Table IV. will be found useful, as a general Table, for many other Purposes, where the Fluxions of spherical Triangles are concerned; of which take one.

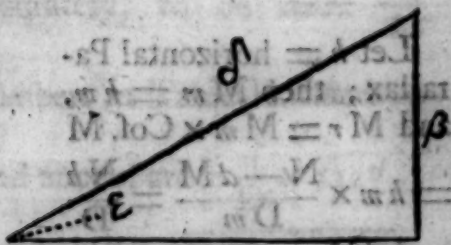
EXAMPLE.

Let it be required to find the Deviation of a Star's Parallel of Declination from the fixed horizontal Wire of a Quadrant placed in the Meridian, at any small given Distance of the Star from the Meridian. Enter the Table with the Star's Distance from the nearest Pole of the Equator at Top, and the given Distance from the Meridian, expressed in Minutes of a great Circle on the Side (in the Column marked Parallax) and you will find the Deviation required. Suppose the Distance of the Star from the Pole to be 10° , and the Distance from the Meridian to be $30'$ of an Arch of a great Circle, the Deviation will be found $45''$.

PROBLEM.

Having given the Hypothenuse δ , and one Leg β , of a right-angled spherical Triangle, to find the Angle opposite to this Leg.

Let ϵ be the Angle of a right-angled rectilinear Triangle, whose Hypothenuse is δ , and one Side β , and in Table IV. find what Number of Seconds answers to β in the Column of Parallax, and ϵ among the Distances; $\frac{1}{4}$ of this Number added to the Angle ϵ in the rectilinear Triangle, will give the spherical Angle.



EXAMPLE.

Let $\beta = 1^\circ$, $\delta = 2^\circ$, and therefore $\epsilon = 30^\circ$; the Number in Table IV. answering to $60'$ and 30° is $54''$, $\frac{1}{4}$ of which is $18''$; whence the spherical Angle $= 30^\circ. 0'. 18''$.

[This was communicated by Mr. LYONS.]

CORRECTION

CORRECTION

TO BE APPLIED TO THE EFFECT OF REFRACTION

Found by the above or any other Method,

On account of the Barometer and Thermometer.

THE Refractions in Altitude, and consequently the Effect of Refraction upon the Moon's Distance from a Star, varying with the Changes of the Temperature of the Air, indicated by the Barometer and Thermometer, it becomes necessary to pay a Regard to this Circumstance, when the utmost Accuracy is required, and therefore as often as the supplemental Tables are made use of.

The Table of Refractions in Altitude, p. 2. was adapted by Dr. Bradley to the Altitude 50° of Fahrenheit's Thermometer, and the Altitude 29,6 Inches of the Barometer; and it will answer equally to the Altitude 55 of the Thermometer, and 30 Inches of the Barometer, which is about its mean Altitude at the Level of the Sea.

When they are at any other Heights, to find what Correction must be made to the Effect of Refraction, already found by Tables I. and II. or Table III. with the supplemental Tables; say, As 400 is to the Difference of the Thermometer from 55° ; so is the Effect of Refraction, before found, to its Correction required; to be subtracted from thence, if the Thermometer is higher than 55° ; but to be added, if the Thermometer is lower.

Take the Difference between the Altitude of the Barometer and 30 Inches, and say, As 300 is to the said Difference, expressed in Tenths of an Inch; so is the Effect of Refraction corrected for the Thermometer, to the Correction required on account of the Barometer; which added to or subtracted from the Effect of Refraction corrected for the Thermometer, ac-

according as the Barometer is higher or lower than 30 Inches, gives the true Effect of Refraction corrected on account of both.

The common Barometer not being proper to be used at Sea, and the Changes of Refraction relative to this Instrument being generally much less than those answering to the Changes of the Thermometer, especially near and between the Tropics, perhaps the Correction of the Effect of Refraction on account of the Barometer will generally be omitted, except the Instrument called the Marine Barometer shall be found, or be improved, to be of sufficient Exactness for Use at Sea.

The Thermometer made use of should be of Fahrenheit's Scale; and if not kept always in a shady Place in the open Air, should be brought out when wanted, and kept in the Air for at least five Minutes, when it will come to its proper Station, answerable to the Temperature of the Air.

The Refraction in Altitude taken out of the Table, p. 2. may, in like Manner as above, be corrected on account of the Barometer and Thermometer; but this will be of no great Consequence for correcting Altitudes taken from the Horizon of the Sea, as they can seldom be taken so exact as the Distance of the Moon from the Sun or Stars may; and the Exactness of a Minute is more than sufficient for all the Purposes to which the Altitudes taken at Sea are at present applied in the Practice of Navigation. But should an Observer take Altitudes of the Sun or Stars at Land, for finding his Latitude or the Time of the Day, with a well-divided astronomical Quadrant, or with a good Hadley's Quadrant, by the Help of Reflexion from a Basin of Water or Quicksilver, defended from the Wind, in such Case it might be proper that he should first correct the Refractions taken out of Table p. 2. in the Manner above explained, before he applies them to the Reduction of his Observations.

I cannot conclude this Subject without first paying a Tribute of Justice due to the Memories of those great Astronomers, Dr. Halley and Dr. Bradley, in the following Remark; that as to the former, we owe the Hint of the Use that may be made of the Barometer and Thermometer in correcting astronomical Refractions; so to the latter we owe the first Example of putting this Method in Practice, together with a more accurate Table of mean Refractions than was known before (see p. 2.) and a most excellent Rule expressing the Changes of the same Refractions, answering to the Variations of the Thermometer (the Substance of which is given above) deduced from the Mean of a great many Observations, made with an Instrument far superior to any before used in the Practice of Astronomy.

A NEW
METHOD
OF COMPUTING THE EFFECT OF
REFRACTION
AND
PARALLAX
UPON THE
MOON'S DISTANCE
FROM THE
SUN OR A FIXED STAR.

BY MR. DUNTHORNE.

A TABLE for reducing the apparent to the true Altitude of the Moon. I.

Hor. Par. D	53	54	55	56	57
Alt. D	Cor ⁿ . +	Cor ⁿ . +	Cor ⁿ . +	Cor ⁿ . +	Cor ⁿ . +
°	' "	' "	' "	' "	' "
0	20. 0	21. 0	22. 0	23. 0	24. 0
1	28. 31	29. 31	30. 31	31. 31	32. 31
2	34. 23	35. 23	36. 23	37. 23	38. 23
3	38. 20	39. 20	40. 20	41. 20	42. 20
4	41. 1	42. 1	43. 1	44. 1	45. 1
5	42. 54	43. 53	44. 53	45. 53	46. 53
6	44. 15	45. 14	46. 14	47. 14	48. 13
7	45. 16	46. 15	47. 15	48. 14	49. 14
8	46. 0	46. 59	47. 58	48. 58	49. 57
9	46. 32	47. 32	48. 31	49. 30	50. 29
10	46. 57	47. 56	48. 55	49. 54	50. 53
11	47. 15	48. 14	49. 13	50. 12	51. 11
12	47. 27	48. 26	49. 25	50. 23	51. 22
13	47. 35	48. 34	49. 32	50. 31	51. 29
14	47. 40	48. 38	49. 36	50. 35	51. 33
15	47. 42	48. 40	49. 38	50. 36	51. 34
16	47. 40	48. 38	49. 35	50. 33	51. 31
17	47. 36	48. 34	49. 31	50. 29	51. 26
18	47. 31	48. 28	49. 25	50. 22	51. 19
19	47. 23	48. 20	49. 16	50. 13	51. 10
20	47. 13	48. 9	49. 6	50. 2	50. 59
21	47. 2	47. 58	48. 54	49. 50	50. 46
22	46. 48	47. 44	48. 39	49. 35	50. 31
23	46. 33	47. 29	48. 24	49. 19	50. 14
24	46. 18	47. 12	48. 7	49. 2	49. 57
25	46. 0	46. 55	47. 49	48. 44	49. 38
26	45. 42	46. 36	47. 30	48. 24	49. 18
27	45. 22	46. 16	47. 9	48. 3	48. 56
28	45. 1	45. 54	46. 47	47. 40	48. 33
29	44. 39	45. 31	46. 24	47. 16	48. 9
30	44. 15	45. 7	45. 59	46. 51	47. 43

A TABLE for reducing the apparent to the true Altitude
of the Moon. I. continued.

Hor. Par. D	58	59	60	61	62
Alt. D	Cor ⁿ . +	Cor ⁿ . +	Cor ⁿ . +	Cor ⁿ . +	Cor ⁿ . +
°	' "	' "	' "	' "	' "
0	25. 0	26. 0	27. 0	28. 0	29. 0
1	33. 31	34. 31	35. 31	36. 31	37. 31
2	39. 23	40. 23	41. 23	42. 23	43. 23
3	43. 20	44. 20	45. 19	46. 19	47. 19
4	46. 0	47. 0	48. 0	49. 0	50. 0
5	47. 52	48. 52	49. 52	50. 52	51. 52
6	49. 13	50. 13	51. 12	52. 12	53. 12
7	50. 14	51. 13	52. 13	53. 12	54. 12
8	50. 57	51. 56	52. 56	53. 55	54. 54
9	51. 29	52. 28	53. 27	54. 26	55. 26
10	51. 52	52. 51	53. 50	54. 50	55. 49
11	52. 9	53. 8	54. 7	55. 6	56. 5
12	52. 21	53. 19	54. 18	55. 17	56. 16
13	52. 28	53. 26	54. 25	55. 23	56. 22
14	52. 31	53. 29	54. 28	55. 26	56. 24
15	52. 31	53. 29	54. 27	55. 25	56. 23
16	52. 28	53. 26	54. 24	55. 21	56. 19
17	52. 23	53. 21	54. 18	55. 16	56. 13
18	52. 16	53. 13	54. 10	55. 7	56. 4
19	52. 6	53. 3	54. 0	54. 57	55. 53
20	51. 55	52. 51	53. 48	54. 44	55. 40
21	51. 42	52. 38	53. 34	54. 30	55. 26
22	51. 26	52. 22	53. 18	54. 13	55. 9
23	51. 10	52. 5	53. 0	53. 55	54. 51
24	50. 52	51. 47	52. 41	53. 36	54. 31
25	50. 32	51. 27	52. 21	53. 15	54. 10
26	50. 12	51. 5	51. 59	52. 53	53. 47
27	49. 49	50. 43	51. 36	52. 30	53. 23
28	49. 26	50. 19	51. 12	52. 5	52. 58
29	49. 1	49. 54	50. 46	51. 39	52. 31
30	48. 35	49. 27	50. 19	51. 11	52. 3

A TABLE for reducing the apparent to the true Altitude
of the Moon. I. continued.

Hor. Par. D	/ 53	/ 54	/ 55	/ 56	/ 57
Alt. D	Cor ⁿ . +	Cor ⁿ . +	Cor ⁿ . +	Cor ⁿ . +	Cor ⁿ . +
°	/ //	/ //	/ //	/ //	/ //
30	44. 15	45. 7	45. 59	46. 51	47. 43
31	43. 51	44. 43	45. 34	46. 25	47. 17
32	43. 26	44. 16	45. 7	45. 58	46. 49
33	42. 59	43. 50	44. 40	45. 30	46. 21
34	42. 32	43. 22	44. 11	45. 1	45. 51
35	42. 3	42. 53	43. 42	44. 31	45. 20
36	41. 34	42. 23	43. 12	44. 0	44. 48
37	41. 4	41. 52	42. 40	43. 28	44. 16
38	40. 33	41. 20	42. 7	42. 55	43. 42
39	40. 1	40. 47	41. 34	42. 21	43. 7
40	39. 28	40. 14	41. 0	41. 46	42. 32
41	38. 54	39. 40	40. 25	41. 10	41. 56
42	38. 20	39. 4	39. 49	40. 34	41. 18
43	37. 44	38. 28	39. 12	39. 56	40. 40
44	37. 8	37. 52	38. 35	39. 18	40. 1
45	36. 32	37. 14	37. 56	38. 39	39. 21
46	35. 54	36. 35	37. 17.	37. 59	38. 41
47	35. 16	35. 56	36. 37.	37. 18	37. 59
48	34. 37	35. 17	35. 57.	36. 37	37. 17
49	33. 57	34. 36	35. 16.	35. 55	36. 34
50	33. 16	33. 55	34. 34.	35. 12	35. 51
51	32. 35	33. 13	33. 51	34. 29	35. 6
52	31. 54	32. 30	33. 7	33. 44	34. 21
53	31. 11	31. 47	32. 23	32. 59	33. 36
54	30. 28	31. 3	31. 39	32. 14	32. 49
55	29. 44	30. 19	30. 53	31. 28	32. 2
56	29. 0	29. 33	30. 7	30. 41	31. 14
57	28. 15	28. 48	29. 20	29. 53	30. 26
58	27. 30	28. 1	28. 33	29. 5	29. 37
59	26. 44	27. 14	27. 45	28. 16	28. 47
60	25. 57	26. 27	26. 57	27. 27	27. 57

A TABLE for reducing the apparent to the true Altitude
of the Moon. I. continued.

Hor. Par. D	' 58	' 59	' 60	' 61	' 62
Alt. D	Cor ⁿ . +	Cor ⁿ . +	Cor ⁿ . +	Cor ⁿ . +	Cor ⁿ . +
°	' "	' "	' "	' "	' "
30	48. 35	49. 27	50. 19	51. 11	52. 3
31	48. 8	49. 0	49. 51	50. 43	51. 34
32	47. 40	48. 31	49. 22	50. 13	51. 4
33	47. 11	48. 1	48. 52	49. 42	50. 32
34	46. 41	47. 30	48. 20	49. 10	50. 0
35	46. 9	46. 58	47. 47	48. 37	49. 26
36	45. 37	46. 25	47. 14	48. 2	48. 51
37	45. 3	45. 51	46. 39	47. 27	48. 15
38	44. 29	45. 16	46. 4	46. 51	47. 39
39	43. 54	44. 41	45. 27	46. 14	47. 1
40	43. 18	44. 4	44. 50	45. 36	46. 22
41	42. 41	43. 26	44. 11	44. 57	45. 42
42	42. 3	42. 47	43. 32	44. 17	45. 1
43	41. 24	42. 8	42. 52	43. 36	44. 19
44	40. 44	41. 27	42. 11	42. 54	43. 37
45	40. 4	40. 46	41. 29	42. 11	42. 53
46	39. 22	40. 4	40. 46	41. 27	42. 9
47	38. 40	39. 21	40. 2	40. 43	41. 24
48	37. 57	38. 37	39. 18	39. 58	40. 38
49	37. 14	37. 53	38. 32	39. 12	39. 51
50	36. 29	37. 8	37. 46	38. 25	39. 3
51	35. 44	36. 22	37. 0	37. 37	38. 15
52	34. 59	35. 35	36. 12	36. 49	37. 26
53	34. 12	34. 48	35. 24	36. 0	36. 36
54	33. 24	34. 0	34. 35	35. 10	35. 45
55	32. 36	33. 11	33. 45	34. 20	34. 54
56	31. 48	32. 21	32. 55	33. 28	34. 2
57	30. 58	31. 31	32. 4	32. 36	33. 9
58	30. 9	30. 40	31. 12	31. 44	32. 16
59	29. 18	29. 49	30. 20	30. 51	31. 22
60	28. 27	28. 57	29. 27	29. 57	30. 27

A TABLE for reducing the apparent to the true Altitude of the Moon. I. continued.

Hor. Par. D	53	54	55	56	57
Alt. D	Cor ⁿ . +	Cor ⁿ . +	Cor ⁿ . +	Cor ⁿ . +	Cor ⁿ . +
°	' "	' "	' "	' "	' "
60	25. 57	26. 27	26. 57	27. 27	27. 57
61	25. 10	25. 39	26. 8	26. 37	27. 6
62	24. 22	24. 51	25. 19	25. 47	26. 15
63	23. 35	24. 2	24. 29	24. 56	25. 23
64	22. 46	23. 12	23. 39	24. 5	24. 31
65	21. 57	22. 23	22. 48	23. 13	23. 39
66	21. 8	21. 32	21. 57	22. 21	22. 46
67	20. 18	20. 42	21. 5	21. 29	21. 52
68	19. 28	19. 51	20. 13	20. 36	20. 58
69	18. 38	18. 59	19. 21	19. 42	20. 4
70	17. 47	18. 7	18. 28	18. 49	19. 9
71	16. 56	17. 15	17. 35	17. 54	18. 14
72	16. 4	16. 23	16. 41	17. 0	17. 18
73	15. 12	15. 30	15. 47	16. 5	16. 23
74	14. 20	14. 37	14. 53	15. 10	15. 26
75	13. 28	13. 43	13. 59	14. 14	14. 30
76	12. 35	12. 50	13. 4	13. 19	13. 33
77	11. 42	11. 56	12. 9	12. 23	12. 36
78	10. 49	11. 2	11. 14	11. 27	11. 39
79	9. 55	10. 7	10. 19	10. 30	10. 42
80	9. 2	9. 13	9. 23	9. 33	9. 44
81	8. 8	8. 18	8. 27	8. 37	8. 46
82	7. 15	7. 23	7. 31	7. 40	7. 48
83	6. 21	6. 28	6. 35	6. 42	6. 50
84	5. 26	5. 33	5. 39	5. 45	5. 51
85	4. 32	4. 37	4. 43	4. 48	4. 53
86	3. 38	3. 42	3. 46	3. 50	3. 55
87	2. 43	2. 47	2. 50	2. 53	2. 56
88	1. 49	1. 51	1. 53	1. 55	1. 57
89	0. 54	0. 56	0. 57	0. 58	0. 59
90	0. 0	0. 0	0. 0	0. 0	0. 0

A TABLE for reducing the apparent to the true Altitude
of the Moon. I. concluded.

Hor. Par. D	58	59	60	61	62
Alt. D	Cor ⁿ . +	Cor ⁿ . +	Cor ⁿ . +	Cor ⁿ . +	Cor ⁿ . +
0	1 11	1 11	1 11	1 11	1 11
60	28. 27	28. 57	29. 27	29. 57	30. 27
61	27. 35	28. 4	28. 34	29. 3	29. 32
62	26. 43	27. 11	27. 40	28. 8	28. 36
63	25. 51	26. 18	26. 45	27. 12	27. 40
64	24. 58	25. 24	25. 50	26. 17	26. 43
65	24. 4	24. 30	24. 55	25. 20	25. 46
66	23. 10	23. 34	23. 59	24. 23	24. 48
67	22. 16	22. 39	23. 2	23. 26	23. 49
68	21. 21	21. 43	22. 6	22. 28	22. 51
69	20. 25	20. 47	21. 8	21. 30	21. 51
70	19. 30	19. 50	20. 11	20. 31	20. 52
71	18. 33	18. 53	19. 12	19. 32	19. 52
72	17. 37	17. 55	18. 14	18. 33	18. 51
73	16. 40	16. 58	17. 15	17. 33	17. 50
74	15. 43	16. 0	16. 16	16. 33	16. 49
75	14. 46	15. 1	15. 17	15. 32	15. 48
76	13. 48	14. 2	14. 17	14. 31	14. 46
77	12. 50	13. 3	13. 17	13. 30	13. 44
78	11. 51	12. 4	12. 16	12. 29	12. 41
79	10. 53	11. 4	11. 16	11. 27	11. 39
80	9. 54	10. 5	10. 15	10. 25	10. 36
81	8. 55	9. 5	9. 14	9. 24	9. 33
82	7. 56	8. 5	8. 13	8. 21	8. 30
83	6. 57	7. 4	7. 12	7. 19	7. 26
84	5. 58	6. 4	6. 10	6. 17	6. 23
85	4. 58	5. 4	5. 9	5. 14	5. 19
86	3. 59	4. 3	4. 7	4. 11	4. 15
87	2. 59	3. 2	3. 5	3. 9	3. 12
88	1. 59	2. 2	2. 4	2. 6	2. 8
89	1. 0	1. 1	1. 2	1. 3	1. 4
90	0. 0	0. 0	0. 0	0. 0	0. 0

A TABLE of Logarithmic Differences for readily computing the true Distance of the Moon from a Fixed Star.

II.

Hor. Par. D.	53	54	55	56	57
Alt. D.	Log. Diff.	Log. Diff.	Log. Diff.	Log. Diff.	Log. Diff.
0					
1	+ 11.3	+ 11.2	+ 11.1	+ 11.0	+ 10.9
2	+ 4.2	+ 3.9	+ 3.6	+ 3.2	+ 2.9
3	- 5.3	- 5.9	- 6.5	- 7.1	- 7.6
4	16.1	16.9	17.7	18.5	19.3
5	27.3	28.4	29.4	30.5	31.5
6	38.8	40.1	41.3	42.6	43.9
7	50.4	51.9	53.4	54.9	56.3
8	62.0	63.7	65.5	67.2	68.9
9	73.6	75.6	77.5	79.4	81.4
10	85.2	87.4	89.5	91.7	93.8
11	96.8	99.1	101.5	103.9	106.3
12	108.3	110.9	113.5	116.1	118.7
13	119.7	122.6	125.4	128.2	131.0
14	131.2	134.2	137.2	140.3	143.3
15	142.6	145.8	149.0	152.3	155.6
16	154.0	157.4	160.9	164.3	167.8
17	165.2	168.9	172.5	176.2	179.9
18	176.4	180.3	184.2	188.1	192.0
19	187.6	191.7	195.8	199.9	204.0
20	198.7	203.1	207.3	211.6	216.0
21	209.8	214.2	218.8	223.3	227.8
22	220.8	225.5	230.2	234.9	239.6
23	231.6	236.5	241.4	246.3	251.3
24	242.3	247.5	252.6	257.8	262.9
25	253.2	258.4	263.8	269.1	274.5
26	263.7	269.3	274.8	280.4	285.9
27	274.3	280.1	285.8	291.6	297.3
28	284.8	290.8	296.7	302.7	308.5
29	295.2	301.3	307.4	313.6	319.7
30	305.5	311.7	318.1	324.4	330.8
31	315.6	322.1	328.7	335.2	341.7

A TABLE of Logarithmic Differences for readily computing the true Distance of the Moon from a Fixed Star.
H. continued.

Hor. Par. D	58	59	60	61	62
Alt. D	Log. Diff.	Log. Diff.	Log. Diff.	Log. Diff.	Log. Diff.
0					
0	+ 10.8	+ 10.8	+ 10.7	+ 10.6	+ 10.4
1	+ 2.5	+ 2.2	+ 1.8	+ 1.5	+ 1.1
2	- 8.2	- 8.8	- 9.4	- 10.0	- 10.6
3	20.1	21.0	21.8	22.6	23.5
4	32.5	33.6	34.7	35.7	36.8
5	45.1	46.4	47.7	49.0	50.3
6	57.8	59.4	60.8	62.4	63.9
7	70.6	72.3	74.1	75.8	77.6
8	83.3	85.3	87.2	89.2	91.1
9	96.0	98.2	100.3	102.5	104.7
10	108.6	111.0	113.4	115.9	118.2
11	121.3	123.9	126.5	129.1	131.7
12	133.8	136.6	139.5	142.3	145.2
13	146.4	149.4	152.4	155.5	158.5
14	158.8	162.0	165.4	168.6	171.9
15	171.2	174.7	178.2	181.7	185.2
16	183.5	187.1	191.0	194.5	198.3
17	195.8	199.8	203.7	207.6	211.5
18	208.1	212.2	216.3	220.4	224.6
19	220.2	224.6	228.9	233.3	237.6
20	232.3	236.8	241.4	245.9	250.4
21	244.4	249.1	253.8	258.6	263.3
22	256.2	261.2	266.1	271.0	276.0
23	268.1	273.2	278.3	283.5	288.6
24	279.8	285.2	290.5	295.8	301.2
25	291.4	297.0	302.5	308.1	313.7
26	303.1	308.7	314.5	320.2	326.0
27	314.4	320.4	326.3	332.3	338.3
28	325.8	332.0	338.1	344.3	350.4
29	337.0	343.4	349.7	356.1	362.4
30	348.2	354.7	361.3	367.8	374.3

A TABLE of Logarithmic Differences for readily computing the true Distance of the Moon from a Fixed Star.
II. continued.

Hor. Par. D	53	54	55	56	57
Alt. D	Log. Diff.	Log. Diff.	Log. Diff.	Log. Diff.	Log. Diff.
0					
30	315.6	322.1	328.7	335.2	341.7
31	325.7	332.4	339.1	345.8	352.5
32	335.7	342.5	349.4	356.3	363.2
33	345.5	352.6	359.7	366.8	373.8
34	355.3	362.6	369.8	377.1	384.3
35	364.9	372.3	379.8	387.2	394.7
36	374.4	382.0	389.7	397.3	404.9
37	383.8	391.6	399.3	407.2	415.0
38	393.1	401.1	409.0	417.0	425.0
39	402.3	410.4	418.5	426.7	434.8
40	411.3	419.6	427.9	436.2	444.6
41	420.2	428.7	437.2	445.6	454.1
42	428.9	437.6	446.2	454.9	463.5
43	437.5	446.4	455.2	464.0	472.8
44	446.0	455.0	464.0	472.9	481.9
45	454.4	463.5	472.6	481.8	490.9
46	462.6	471.8	481.1	490.4	499.7
47	470.6	480.0	489.5	498.9	508.4
48	478.5	488.1	497.7	507.3	516.9
49	486.3	496.0	505.7	515.5	525.2
50	493.9	503.8	513.6	523.5	533.4
51	501.4	511.4	521.4	531.4	541.4
52	508.7	518.8	529.0	539.1	549.3
53	515.8	526.1	536.3	546.6	556.9
54	522.7	533.2	543.6	554.0	564.4
55	529.5	540.1	550.6	561.2	571.7
56	536.1	546.8	557.5	568.1	578.8
57	542.6	553.4	564.2	574.9	585.7
58	548.8	559.7	570.6	581.6	592.5
59	554.9	565.9	577.0	588.0	599.1
60	560.8	571.9	583.1	594.2	605.4

A TABLE of Logarithmic Differences for readily computing the true Distance of the Moon from a Fixed Star.
II. continued.

Hor. Par. D	58	59	60	61	62
Alt. D	Log. Diff.	Log. Diff.	Log. Diff.	Log. Diff.	Log. Diff.
0					
30	348.2	354.7	361.3	367.8	374.3
31	359.2	366.0	372.7	379.4	386.1
32	370.1	377.1	383.9	390.9	397.8
33	380.9	388.0	395.1	402.2	409.3
34	391.6	398.9	406.1	413.4	420.7
35	402.1	409.6	417.0	424.5	432.0
36	412.5	420.2	427.8	435.5	443.1
37	422.9	430.6	438.5	446.3	454.1
38	433.0	441.0	449.0	457.0	465.0
39	443.0	451.2	459.3	467.5	475.7
40	452.9	461.2	469.6	477.9	486.2
41	462.7	471.1	479.6	488.1	496.7
42	472.2	480.9	489.5	498.2	506.9
43	481.6	490.5	499.3	508.1	517.0
44	490.9	499.9	508.9	517.9	526.9
45	500.0	509.2	518.3	527.5	536.6
46	509.0	518.3	527.6	536.9	546.2
47	517.8	527.3	536.7	546.2	555.6
48	526.5	536.1	545.7	555.3	564.9
49	535.0	544.7	554.5	564.2	574.0
50	543.3	553.2	563.1	573.0	582.9
51	551.4	561.5	571.5	581.5	591.6
52	559.4	569.6	579.8	589.9	600.1
53	567.2	577.6	587.8	598.1	608.5
54	574.8	585.3	595.7	606.1	616.6
55	582.3	592.8	603.4	614.0	624.5
56	589.5	600.2	610.9	621.6	632.3
57	596.6	607.4	618.2	629.0	639.8
58	603.4	614.3	625.2	636.2	647.1
59	610.1	621.1	632.1	643.2	654.2
60	616.5	627.7	638.8	650.0	661.2

A TABLE of Logarithmic Differences for readily computing the true Distance of the Moon from a Fixed Star,
II. continued.

Hor. Par. D	53	54	55	56	57
Alt. D	Log. Diff.	Log. Diff.	Log. Diff.	Log. Diff.	Log. Diff.
0					
60	560.8	571.9	583.1	594.2	605.4
61	566.5	577.8	589.0	600.3	611.5
62	572.1	583.5	594.8	606.2	617.5
63	577.6	589.0	600.4	611.9	623.4
64	582.8	594.3	605.9	617.4	629.0
65	587.9	599.5	611.0	622.8	634.4
66	592.7	604.4	616.2	627.9	639.7
67	597.3	609.2	621.0	632.8	644.7
68	601.8	613.8	625.7	637.6	649.5
69	606.1	618.2	630.2	642.2	654.2
70	610.2	622.3	634.4	646.5	658.5
71	614.2	626.3	638.5	650.6	662.7
72	617.8	630.1	642.4	654.5	666.7
73	621.1	633.7	645.9	658.2	670.5
74	624.7	637.0	649.4	661.7	674.2
75	627.9	640.3	652.7	665.1	677.5
76	630.9	643.3	655.7	668.2	680.6
77	633.6	646.0	658.3	671.1	683.6
78	636.0	648.6	661.2	673.7	686.3
79	638.3	650.9	663.5	676.1	688.7
80	640.5	653.1	665.7	678.3	691.0
81	642.3	654.9	667.7	680.4	693.1
82	644.0	656.7	669.4	682.2	694.9
83	645.5	658.2	671.0	683.8	696.5
84	646.9	659.5	672.3	685.2	697.9
85	647.9	660.7	673.5	686.4	699.1
86	648.8	661.6	674.5	687.3	700.1
87	649.5	662.3	675.2	688.0	700.9
88	650.1	662.9	676.0	688.5	701.5
89	650.3	663.2	676.2	688.9	701.8

A TABLE of Logarithmic Differences for readily computing the true Distance of the Moon from a Fixed Star.

II. concluded.

Hor. Par. D	' 58	' 59	' 60	' 61	' 61
Alt. D	Log. Diff.	Log. Diff.	Log. Diff.	Log. Diff.	Log. Diff.
0					
60	616.5	627.7	638.8	650.0	661.2
61	622.8	634.0	645.3	656.6	667.9
62	628.9	640.3	651.6	663.0	674.4
63	634.8	646.3	657.8	669.2	680.7
64	640.6	652.1	663.7	675.3	686.9
65	646.1	657.8	669.4	681.1	692.8
66	651.4	663.2	674.9	686.7	698.4
67	656.5	668.3	680.4	692.0	703.9
68	661.4	673.3	685.3	697.2	709.2
69	666.2	678.1	690.2	702.2	714.2
70	670.6	682.7	694.8	706.9	719.0
71	674.9	687.0	699.2	711.3	723.5
72	678.9	691.2	703.4	715.6	727.9
73	682.8	695.1	707.4	719.7	732.0
74	686.5	698.8	711.2	723.5	735.9
75	689.9	702.3	714.7	727.1	739.6
76	693.2	705.6	718.1	730.6	743.0
77	696.1	708.5	721.2	733.8	746.2
78	698.8	711.4	724.0	736.6	749.1
79	701.3	714.0	726.5	739.2	751.8
80	703.6	716.3	729.0	741.6	754.3
81	705.7	718.4	731.1	743.8	756.5
82	707.6	720.3	733.1	745.8	758.5
83	709.3	722.0	734.8	747.5	760.3
84	710.7	723.5	736.2	748.9	761.8
85	711.9	724.7	737.5	750.1	763.1
86	712.9	725.7	738.5	751.3	764.2
87	713.7	726.5	739.3	752.1	765.0
88	714.2	727.1	740.0	752.8	765.6
89	714.5	727.3	740.3	753.1	766.0

A TABLE of Logarithmic Differences for finding the true Distance of the Moon from a Fixed Star. II. concluded.

U		S		E	
Alt. Diff.	Log. Diff.	Alt. Diff.	Log. Diff.	Alt. Diff.	Log. Diff.
OF THE PRECEDING					
0.000	0.000	0.000	0.000	0.000	0.000
0.001	0.000	0.001	0.000	0.001	0.000
0.002	0.000	0.002	0.000	0.002	0.000
0.003	0.000	0.003	0.000	0.003	0.000
0.004	0.000	0.004	0.000	0.004	0.000
0.005	0.000	0.005	0.000	0.005	0.000
0.006	0.000	0.006	0.000	0.006	0.000
0.007	0.000	0.007	0.000	0.007	0.000
0.008	0.000	0.008	0.000	0.008	0.000
0.009	0.000	0.009	0.000	0.009	0.000
0.010	0.000	0.010	0.000	0.010	0.000
PROBLEM.					
HAVING the apparent or observed Distance of the Moon from a Fixed Star, together with the observed Altitude of each, to find their true Distance.					
0.000	0.000	0.000	0.000	0.000	0.000
0.001	0.000	0.001	0.000	0.001	0.000
0.002	0.000	0.002	0.000	0.002	0.000
0.003	0.000	0.003	0.000	0.003	0.000
0.004	0.000	0.004	0.000	0.004	0.000
0.005	0.000	0.005	0.000	0.005	0.000
0.006	0.000	0.006	0.000	0.006	0.000
0.007	0.000	0.007	0.000	0.007	0.000
0.008	0.000	0.008	0.000	0.008	0.000
0.009	0.000	0.009	0.000	0.009	0.000
0.010	0.000	0.010	0.000	0.010	0.000
SOLUTION.					
With the Moon's horizontal Parallax, and apparent Altitude, take out the Correction of her Altitude from Table I. also the logarithmic Difference from Table II. which reserve; and to the Correction of the Moon's Altitude add the Refraction of the Star; this Sum added to or subtracted from the Difference of the observed Altitudes, according as the Moon is higher or lower than the Star, gives the Difference of their true Altitudes.					
Then, from the Natural-cosine of the Difference of the apparent Altitudes subtract the Natural-cosine of the observed Distance, and find the Logarithm of the Remainder, from which take the logarithmic Difference before reserved, and you will have a Logarithm, whose corresponding Number subtracted from the Natural-cosine of the Difference of their true Altitudes leaves the Natural-cosine of the true Distance required.					
0.000	0.000	0.000	0.000	0.000	0.000
0.001	0.000	0.001	0.000	0.001	0.000
0.002	0.000	0.002	0.000	0.002	0.000
0.003	0.000	0.003	0.000	0.003	0.000
0.004	0.000	0.004	0.000	0.004	0.000
0.005	0.000	0.005	0.000	0.005	0.000
0.006	0.000	0.006	0.000	0.006	0.000
0.007	0.000	0.007	0.000	0.007	0.000
0.008	0.000	0.008	0.000	0.008	0.000
0.009	0.000	0.009	0.000	0.009	0.000
0.010	0.000	0.010	0.000	0.010	0.000
EXAMPLE.					

EXAMPLE.

(From Mr. MASKELYNE'S Mariner's Guide, p. 17, &c.)

1762, May 9, at 12^h. 34'. 19'' apparent Time at Greenwich,
according to Account at Sea,

The apparent Distance of the Moon's Centre from }
Spica Virginis was } 51. 28. 35

The apparent Altitude of the Star 24. 48

The apparent Altitude of the Moon's Centre . . . 12. 30

Difference of the apparent or observed Altitudes . 12. 18

Correction of the Moon's Altitude from }
Table I. } 50. 42 }
Refraction of the Star 2. 3 }
Sum subtracted 52. 45

Difference of their true Altitudes 11. 25. 15

Natural-cosine of the Difference of apparent Al- }
titudes } 97705

Natural-cosine of 51°. 28'. 35'', the apparent Di- }
stance } 62283

Difference of the Natural-cosines 35422

Logarithm thereof 4.54927
Logarithmic Difference taken from Table II. sub- }
tract } 135

Remainder 4.54792

Number corresponding thereunto 35312

Natural-cosine of 11°. 25'. 15'', the Difference of }
their true Altitudes } 98020
From which subtract the above corresponding }
Number } 35312

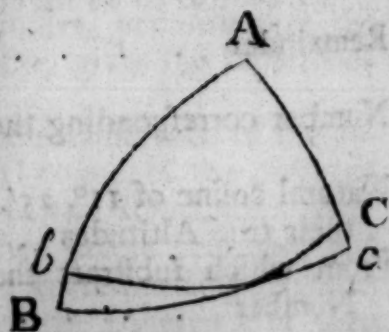
Leaves Natural-cosine of 51°. 9'. 54'', the Moon's }
true Distance from the Star } 62708

Note: If only the first five Figures of the Sines and Logarithms be used, they will commonly determine the Moon's true Distance from a Star, within 5'', or at most 10''; in which Case, the last Figure of the logarithmic Differences is to be omitted, and if the Star's Altitude be above 5°, the remaining Figures will need no Correction: but if greater Exactness be desired, so that six Figures of the Sines and Logarithms be taken, all the Figures in the Table of logarithmic Differences are to be made use of; and if the Star's Altitude does not exceed 25°, are to be increased, as in the following Table.

Alt. of the Star.	Particles to be added to Log. Diff.	Alt. of the Star.	Particles to be added to Log. Diff.
0		0	
2	4.4	10	0.4
3	2.7	11	0.3
4	1.8	12	0.3
5	1.3	13	0.2
6	0.9	14	0.2
7	0.7	15	0.1
8	0.6	20	0.1
9	0.5	25	0.1

Investigation of the foregoing SOLUTION.

In the spherical Triangle BAC, wherein A represents the Zenith, B the Moon, and C the Star, are given the three Sides, to find how much the Base BC is altered, by varying the Sides AB and AC, while the Angle at the Vertex A remains the same.



As $\text{Sine } AB \times \text{Sine } AC : R^2 :: \text{Ver.-sine } BC - \text{Ver.-sine } AB - AC : \text{Ver.-sine } A.$

And, as $\text{Sine } Ab \times \text{Sine } Ac : R^2 :: \text{Ver.-sine } bc - \text{Ver.-sine } Ab - Ac : \text{Ver.-sine } A.$ Per Caswell Trigon. Axiom. 4. Then

Then by Inversion, $R^q : \text{Sine } Ab \times \text{Sine } Ac :: \text{Ver.-fine}$

$$A : \text{Ver.-fine } bc - \text{Ver.-fine } Ab - Ac.$$

And *ex aequo*, $\text{Sine } AB \times \text{Sine } AC : \text{Sine } Ab \times \text{Sine } Ac$

$$:: \text{Ver.-fine } BC - \text{Ver.-fine } AB - AC : \text{Ver.-fine } bc - \text{Ver.-fine } Ab - Ac.$$

But $\text{Ver.-fine } BC - \text{Ver.-fine } AB - AC = \text{Cof. } AB - AC - \text{Cof. } BC,$

And $\text{Ver.-fine } bc - \text{Ver.-fine } Ab - Ac = \text{Cof. } Ab - Ac - \text{Cof. } bc.$

Therefore $\text{Sine } AB \times \text{Sine } AC : \text{Sine } Ab \times \text{Sine } Ac :: \text{Cof.}$

$$AB - AC - \text{Cof. } BC : \text{Cof. } Ab - Ac - \text{Cof. } bc.$$

Whence $\text{Log. of Cof. } AB - AC - \text{Cof. } BC + \text{Log. Sine } Ab + \text{Log. Sine } Ac - \text{Log. Sine } AB - \text{Log. Sine } AC$

$$= \text{Log. of Cof. } Ab - Ac - \text{Cof. } bc.$$

But $\text{Log. Sine } AB - \text{Log. Sine } Ab - \text{Log. Sine } Ac + \text{Log. Sine } AC = \text{logarithmic Differences in Table II. by Construction.}$

Wherefore $\text{Log. of Cof. } AB - AC - \text{Cof. } BC - \text{Log. Diff.}$

$$\text{from Table II.} = \text{Log. of Cof. } Ab - Ac - \text{Cof. } bc.$$

Let $\text{Log. of Cof. } AB - AC - \text{Cof. } BC - \text{Log. Diff. from Table II.}$ be called n , and its corresponding Number N .

Then will n also $= \text{Log. of Cof. } Ab - Ac - \text{Cof. } bc,$ and

$$N = \text{Cof. } Ab - Ac - \text{Cof. } bc.$$

And by Transposition, $\text{Cof. } Ab - Ac - N = \text{Cof. } bc,$ which was to be investigated.

C
c

-fine

-fine

m. 4.

Then

[illegible]

